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EDITORIAL NOTES.

Old Styles and Modern Methods.

THE new President of the Manchester District Institution of Gas Engineers and Managers (Mr. C. S. Shapley), the Engineer and General Manager of the Leeds Corporation Gas Department, last Friday stepped from the beaten tracks of Presidential Addresses, and gave the members something in the nature of a novelty. It was a lantern-illustrated address on exceptional repairs which he has had to undertake the last year or two. There is considerable practical value in this, as, apart from the special character of the work which had to be executed, and which demanded skill and resource, there are lessons in the experiences which will be useful, especially to the younger engineers; they will help them to refrain from doing those things which they ought not to do in their professional duties. Apart from the responsibility of designing works, and carrying them on at a high standard of efficiency, there is nothing which claims more attention from the engineer than their maintenance in a proper state of repair; and this applies particularly to plant which was designed and erected by engineers of an earlier school of thought and training, when less knowledge existed than to-day regarding causes and effects. When one looks at the item of expenditure on the maintenance and repair of works, and considers its relation to total costs, the importance of design and construction in a manner which will keep-down the item to a minimum consistent with good condition is a matter of supreme importance. One of the lessons to be found in Mr. Shapley's address is the necessity for making very critical examination of old designs, to ascertain whether there are features in them which are contributory to a more rapid decline than would be the case if, when opportunity permits, those features were replaced by others preventative of the same deterioration, without introducing any counterbalancing disadvantages.

Take as examples the two cited cases of exceptional repairs to gasholders. Mr. Shapley's presentation of these is in plain language, without special emphasis on the lessons, and none whatever on the ingenious means taken to produce rectification, and in the rectification the elimination of the causes of trouble which had actively assisted the ravages of time. Could the engineers who designed these holders have been present at last Friday's meeting of the Institution, they would perhaps have felt somewhat abashed at finding that they had adopted certain things in the detail upon which they had only bestowed consideration of the effect at the time, while ignoring future effects. Of course, in respect of the choice of a gasholder site, there are limitations; but one would not, if another was available, voluntarily choose a site with, as a neighbour, a chemical works from which emanated fumes destructive of metal. The Dewsbury Road holder which served as one of the President's examples had been built in proximity to a chemical works, or perhaps these may have become neighbours subsequently. Anyway, there was extensive corrosion of the holder on the side which was presented to the chemical works. In choosing the site of a holder, therefore, the suitability of subsoil and location in respect of supply are not the only considerations. Environment should also, before decision, be brought into the view. Upon this holder some 102 sheets were replaced, each measuring 8 ft. by 3 ft. 6 in. Apart from the expedition displayed in performing the work in fourteen days, the value of utilizing the lessons of experience is illustrated. In renewing the sheets, the riveting was reversed, with the cup heads on the inside. In Mr. Shapley's opinion, this is a distinct advantage, in that it assists to resist corrosion. The sheets should also overlap on the inside, as this eliminates any trouble from oils or solvent percolating through the jointing tape after collecting on the inside of the holder, and running down the outside of the sheeting. Furthermore, if the edge of the sheet is hammered-down on the outside when riveting is done, the ledge is too small to hold moisture, and would soon become filled with paint. There can be no question that a holder shell constructed in this way would be much easier to paint and keep free from corrosion.

If that holder affords, from the point of view of preservation or maintenance, illustration of what to avoid, so does the second example—one of the holders at the Kirkstall Road station—and perhaps in greater degree. Longevity in such costly structures cannot be sacrificed to an æsthetic appearance; but if an improved appearance can be obtained without exposing a holder to greater or abnormal depreciation, then we are not averse to it. Where, however, the form of ornamentation is contributory to rapid destruction, and the promotion of risks, then modern engineering would eschew it. But modern engineering calls for less ornamentation than the heavier productions, based on the ideals of the past, claimed from their designers. The lighter designs, with straight or inclined lines, of guide-framing of the present day are graceful to the eye, and need none of the embellishment which was thought to be proper and requisite in times past, and which, as in the case of this Kirkstall holder, gave harbourage to those conditions which hastened destruction. On the guide-framing of the holder, ornamental cast-iron rosettes were used; and behind these it was discovered that the metal of the bracings on the girders had been eaten away. This was due to the fact that through the rosettes a vital part of the structure was inaccessible for painting or repair. Another point is the method of riveting-up the bracings, and the general construction of the lattice girders. The ends of the bracings were hidden between the top and bottom angles of the old girders. This, as the President says, may be very nice from the artistic point of view, but, due to the fact that the flanges of the girders were finished-off with stiffening plates, a channel was left in which water could lodge on the lower flange. After a time, the inside of the angles became corroded and weakened to such an extent that the whole girder began to buckle. All these things have been corrected by constructing the girders in a simple manner with due regard to the strain they have to meet; the top and bottom flanges being formed of T-irons, and the cross-bracings riveted on the outside. They are thus accessible to the painter, and free from any danger of water lodging. It was the falling of a finial and apron-piece which suggested investigation of the condition of the fixings, and revealed more than was anticipated. It was found that the finials and aprons on the standards had the same detrimental effect on the guide-framing as the rosettes. The finials were heavy castings, and the aprons covered the joints of the girders; and the supporting bolts corroded away. Those finials and aprons are no more; and new girders have replaced the top and

second rows. The changes make the holder as sightly in the eyes of the engineer of to-day as probably did the ornamental agents of destruction to the engineer who was responsible for them.

These matters exemplify some of the lessons of a Presidential Address which foresook conventional lines. Other work was described, in connection with which faults in design were remedied, and difficulties were surmounted. In these additional matters—especially the reconstruction and enlargement of a tar well—much interest is also found, and lessons are there to be extracted, combined with illustration of the progress that has been made by engineering to the end that utility, economy, and durability are materially promoted, to the advantage of the item of maintenance in the revenue account.

The Definite Therm Basis.

The analyses of London Gas Companies' accounts for 1925, by Mr. F. J. Bradfield, the General Manager and Secretary of the Commercial Gas Company, which were published in last week's issue, are, as usual, highly instructive. One of the several lessons conveyed by them is found in the comparative bases of "per therm" and "per 1000 c.ft." The figures reveal the definiteness of the therm basis, and the contrary in the per 1000 c.ft. basis. Take, for example, gas made per ton of coal carbonized. In the case of the Commercial Company, we have a production of 13,642 c.ft.; Gas Light and Coke Company, 13,257 c.ft.; South Metropolitan Company, 12,879 c.ft.; and Wandsworth, 14,202 c.ft. We see in those four sets of figures that the Wandsworth Company excel the others in the quantity of gas made per ton of coal, and the Commercial Company come next, with the Gas Light and Coke Company following, and the South Metropolitan Company fourth. But when we look at the gas made per ton on the therm basis, we get the Wandsworth Company with 67·48 therms; Commercial, 69·87; Gas Light and Coke Company, 71·67; and South Metropolitan, 72·34. Thus the South Metropolitan Company stand at the head on the therm basis, with the Gas Light and Coke Company following, succeeded by the Commercial and Wandsworth Companies—Wandsworth, with the highest cubic feet make per ton, coming last, but better than the Brentford Company with 66·07 therms. In the foregoing, we have not included Tottenham, which ranked next to Wandsworth on the volumetric basis with 14,105 c.ft. per ton; and in their case on the therm basis they produced 70·52 therms per ton, which is better than the Commercial, Wandsworth, or Brentford. Of course, all such figures are subject to the diversity of quality of coal and other factors which enter into manufacturing efficiency.

Another interesting comparison is with regard to the capital expended per 1000 c.ft. and therm of gas sold. The result is equally impressive. Per 1000 c.ft. sold, we have the Gas Light and Coke Company with a capital of 8s. 5·28d.; Wandsworth Company, 8s. 0·75d.; South Metropolitan Company, 7s. 7·78d.; and Commercial Company, 7s. 7·67d., which is the lowest of the four. Although the capital of the South Metropolitan Company is higher on that basis than that of the Commercial Company by a small fraction of a penny, when we come to the therms sold basis, we find the difference as between 1s. 4·39d. for the South Metropolitan Company and 1s. 7·3d. for the Commercial Gas Company. Again, on the per 1000 c.ft. basis, the capital of the Gas Light and Coke Company is higher than that of the Wandsworth Company, but on the therm basis we have the former at 1s. 8·26d., as compared with the latter at 1s. 8·58d. Thus we see the importance of computations and comparisons being in all cases on the therm basis rather than on the volumetric.

There are other points outside the therm and cubic feet comparison, which attract attention. One is coke made for sale per ton of coal. The Commercial Company stand the highest in the list with 11·52 cwt.; the next best showing being the Brentford with 10·7 cwt.; and the Gas Light and Coke Company with 10·45 cwt. The Commercial Company have confirmation in the receipts of this higher coke made for sale per ton. They are higher than in any other case with the figure of 13s. 11·01d. per ton of coal. The next best is the Brentford Company, with 12s. 2·53d. The sum realized per ton of coke by the Commercial Company was 24s. 1·88d., as compared with 22s. 9·82d. in the case of Brentford. The Gas Light and Coke Company also realized 22s. 11·54d. per ton of coke; and 11s. 11·96d. per ton of coal carbonized. In this connection, the percentage of coke used as fuel is interesting. Brentford stands lowest in the list with 14·04 p.ct.; Commercial next with 14·65 p.ct.; and the South Metropolitan Company highest with 18·48 p.ct.

We will not specially refer to the many other items of interest in the analyses, except to call attention to the line near the foot—"Percentage of stoves at rental to consumers." In this respect the South Suburban Company stand at the head, with the South Metropolitan Company next; the actual figures being: South Suburban, 116 p.ct.; South Metropolitan, 111 p.ct.; Wandsworth, 98 p.ct.; Commercial, 96 p.ct.; Brentford, 95 p.ct.; Gas Light and Coke Company, 87 p.ct.; Tottenham, 84 p.ct. The last figures to which we wish to call attention are those which show that the Gas Light and Coke Company last year sold on the declared basis therms amounting to 189,469,170, while the Brentford sold 31,398,595. Therefore the amalgamation of the two Companies gives, on the 1925 figures, a total sale in therms of 220,867,765. The next largest sale is that of the South Metropolitan Company with 89,801,764 therms.

A Distinguished Electrician on the Government Scheme.

In the foremost rank of highly cultured and respected electrical engineers stands Dr. J. A. Fleming, F.R.S.; and views emanating from him must always carry considerable weight and influence. To the March issue of our contemporary "Conquest"—a magazine devoted to progress, invention, and discovery—he has contributed an article in which he deals with some of the problems associated with the Government electricity scheme. In this there are three warnings—one to the public, and two to the Government. The warning to the public is that it is the considered opinion of this distinguished authority that they must not place any great hope on the scheme producing cheaper electricity. To the Government a case is presented which should, in the first place, suggest to them that their anticipations of wonderful effects resulting from the scheme have no concrete foundation, and, in the second place, that the prognostications of a flow of cheaper electricity throughout the country, as compared with present practice from well-managed electricity undertakings in good consuming areas, are of a fallacious order. In this regard the Government are up against serious difficulties. It is well known, however, that their views have undergone a marked decline from the initial stages to the present as to the benefits to the nation which this enormous capital-absorbing scheme would bring about; and when men of Dr. Fleming's status in the electricity industry write as he has done in this article, they should pause before committing the country through the electricity industry, in these days of stringent fiscal conditions, to the obligation of spending so freely. There is no pressure for this work being forced forward as suggested by the Government, although it may be admitted, as Dr. Fleming truly points out, that, if there can be a general cheapening of electricity, it is an almost necessary condition that there should be unification of the form of electricity production, and a reduction of the number of small stations, by adopting on the widest scale standard frequency, supply voltage, and type of current, and supplying from a limited number of large power stations located and worked under the best conditions.

In the article it is pointed out, as has been done frequently, that the greatest difficulty with the small power stations generally lies in the low load factor of the demand, which often does not exceed more than about 10 or 15 p.ct., in view of the fact that current is chiefly supplied only for lighting. It is clear that Dr. Fleming is not impressed with the view that electric cooking in private houses is going to do much to improve the load factor, seeing that the houses where electric cookers may

find acceptance would be those in which the cooking would be done between the hours of 5 and 7 p.m., at which time the lighting load is near its peak. Consequently, there seems little hope of the small stations doing anything, by themselves, to elevate their circumstances, although, on the other hand, it has been shown that, from the point of view of generating efficiency, there are certain moderate sized stations which can vie with large stations in their fuel consumption per KW.-H. generated. But the condition is altogether different when one comes to stations which supply electric power for factory use, in which case the load is fairly steady during the working day. Then the load factor may rise to nearly 50 p.ct., as was the case last year in the stations on the North-East Coast, where it was 47 p.ct. The Clyde Valley Company had a load factor of 40 p.ct.; and some of the large municipal stations have a load factor of 30 p.ct. Therefore, it is clear that the only way to increase the load factor of an electric supply station is for it to furnish electric power in considerable proportion to works and factories with a tolerable uniform demand all day. This is not the type of demand which can be obtained by electric cooking and heating, the former of which is intermittent during the day, and the latter applies only to the winter season, when it is of vagarious worth, according to the prevailing atmospheric conditions.

Having pointed out that it is unquestionable—this no one disputes—that electric energy can be generated on a large scale at a lower price per unit, *cæteris paribus*, than on a small scale, Dr. Fleming admits that the more important element in fixing the price to the consumer is that of distribution, and that with stations supplying considerable areas, as is contemplated under the Government scheme, the electric mains and feeders, either underground or overhead, are, generally speaking, a greater item in the total capital outlay than the generating machinery. Thus it is by no means a fair conclusion that electric energy can be supplied more cheaply from a large station at a distance from the seat of utilization than from a small one close by. In order that what the Government have in view may be carried out economically, it is certain, Dr. Fleming points out, that the super-power stations will have to be high voltage, three-phase alternating current ones, transmitting at pressures of 80,000 to 100,000 volts (or even higher), which will have to be reduced by transformers and sub-stations, and be converted to direct current or single-phase alternating current for traction and power purposes or lighting. All this shows that the work of conveying the current from the super-power stations to the places of consumption, will require a large expenditure of both money and time. Hence Dr. Fleming's warning to the public that no immediate advantage in the way of price can be realized. Taking the cost of a super-power station at £15 per KW. all round, it is clear that an outlay of some £50,000,000 may easily be required; and as one of the chief ingredients in this work will be copper, it will have to be purchased from other countries, and so swell our imports. Then there will be the work connected with the distribution plant; the conversion of the small generating stations into transformer ones; and the unifying of frequency. The outlay will have to be on a magnificent scale. Even when all this is achieved, the opinions of experts differ as to the financial gain to be expected if the existing medium power stations in proximity to their supply areas are replaced by high power ones at a distance. Supposing a medium-sized station produces 1000 units per ton of coal used, and some economical plants may produce as much as 1700 units. Then further suppose a super-power station uses the coal and produces, if possible (it is unknown in this country), 2000 units per ton, there would be a saving of coal, and the cost of the carriage of the coal. On the other hand, there would be a loss of at least 10 p.ct. of the available energy in the transmission line of the high-power station, the loss of transformation, and the interest and depreciation on the cost of the line and transforming plant. Therefore Dr. Fleming utters the caution that it must not be hastily assumed that the balance will come out in favour of the super-power station, and leave a sufficient surplus to meet the debt interest on the capital for plant.

With these facts before him, Dr. Fleming urges the general public not to lose their heads over nationalized electricity as was the case in 1882, when the completed invention of the incandescent lamp and the arc lamp first made electric lighting a practical proposition: "The "public then sprang to the conclusion that gas as an "illuminant was doomed; and some people promptly "threw their gas shares on the market, to their great "subsequent regret. The invention of the Welsbach gas "mantle, and the retarding effect of the Electric Lighting "Act of 1882, caused a period of ten years or more to "elapse before electric lighting made much headway "against gas even as an illuminant. Then the great im-"provement in gas stoves and cookers has caused gas "to become the most widely used of house-heating "agencies." There is no question that the proposals of the Government will, when the Bill is available, receive most careful consideration and criticism from financiers, and electrical and other engineers of great experience. To show the Government what they are up against in promising cheaper electricity, Dr. Fleming quotes the accounts of fifteen consumers in the St. Pancras district, who have been on the two-part tariff system for twelve months. In this case a fixed charge at the rate of £16 per KW. per annum is made, reckoned on an estimate of the "active" lamps only on the premises, and then all units consumed are charged at ¾d. per unit. The highest price (the average of the fixed payment and the charge per unit) paid by an individual consumer in the list was 1·984d. and the lowest 0·842d., while the average of the whole fifteen, using in the aggregate 73,806 units, was 0·988d. This shows what the Government is "up against" in competition with existing well-placed electricity supply stations. The cost of generation will have to be much less than that actually achieved in the existing stations in order to cover the cost of long-distance transmission, and give a lower price to the consumers. That is an achievement which, in our opinion, will confound even the British Government.

Electricity Orders for Gas Companies.

THE Electricity Commissioners have issued a set of provisional rules in respect of applications for Special Orders, in pursuance of the Statutory Gas Companies (Electricity Supply Powers) Act of last year; and regarding them readers will be able to obtain detailed information from our news columns to-day. On account of urgency, the rules are to come into immediate operation. It will be seen that the Commissioners will not entertain applications for Special Orders from companies registered under the Companies Acts; they must be statutory companies, and application must be by memorial. Applicants must pay particular attention to the prescriptions as to public notices, preparation of the draft of the Order, and the deposits to be made. Those who wish to object to an Order also have directions as to how they should proceed. Probably there will be very few applications by gas companies which will not find objectors—electrical ones especially, who will bear in mind the very explicit statement which the Electricity Commissioners (whom Parliament intended to be a judicial body) made as to their bias in favour of electrical as contrasted with gas-electrical management. People with a bias cannot be good judges; and we expect unprejudiced minds to be in such office as that occupied by the Electricity Commissioners. Perhaps what will be the least thumbed part of the rules will be that which defines the steps to be taken after an Electricity Order is granted to a gas company. It will be interesting to watch the fate of such applications for Orders, in view of Parliament having conferred the necessary power upon statutory gas undertakings. If the Commissioners adhere to the opinions expressed when the 1925 Act was a Bill, they will probably show their power more frequently in rendering that Act null and void than in allowing the authority it confers to reach maturity. We have not noticed that the Commissioners have ever said that a gas undertaking well-established in a district is not in a better position than a separate company, with a lower order of generating and other facilities, to carry on the business of suppliers of current. If they refuse to recognize the superiority, perhaps they will be able to stretch their

appreciation to the fact that, if it is a question of bulk purchase of current from a large power station, then no better distributing agents than an existing gas company could possibly be found. This condition seems to us to fit in well with the Government scheme for making electricity more available. It is time that the Electricity Commissioners swept from their minds the foolish idea found in the statement they made when the Statutory Gas Companies (Electricity Supply) Bill was before Parliament, that it "must be perfectly obvious to everybody that on general grounds it is preferable that the supply of electricity should, where a company or body of people are able and willing to undertake it, be in the hands of the body whose primary and sole duty should be the supply of electricity." The existence of the Act shows that Parliament rejected the implication contained in that statement. Parliament, at all events, were not inclined to believe that business men such as the administrators of gas undertakings would take upon themselves the burden of additional capital expenditure with the deliberate intention of restricting its earning capacity. However, perhaps now that Parliament have expressed their views by the passing of the measure, the Commissioners will deal with applications by statutory gas companies in a perfectly impartial spirit, with the view of making the utmost use of the economic position of such undertakings in the interests of the communities they desire further to serve.

Examination and Evaluation of Coals.

We commence this week a short series of articles, by Dr. Geoffrey Weyman, on the "Examination and Evaluation of Coals for Carbonizing Purposes." The importance of the subject needs no accentuating. When one examines the developments which are taking place in the gas industry, the imperative claims of economy, and the need for exact knowledge of the properties of coals in order to adjust their utilization to the results required—particularly in respect of coke—it will be agreed that the articles are opportune. Fuller comment is not needed at this stage. The subject alone will ensure a wide study of the contributions.

Lowest Priced Gas in London.

The Wandsworth, Wimbledon, and Epsom District Gas Company are not disposed to allow to pass, without contesting its veracity, the statement in last week's "Journal," that the Hornsey Gas Company are supplying, at 8·5d. per therm, the lowest priced gas in London. They prove their title to the correction, inasmuch as the consumers in the Wandsworth area are enjoying gas at 8·4d. per therm.

Report of the Coal Commission.

It may be that, by the time this issue of the "Journal" reaches our subscribers, the report of the Coal Commission will have become public property; but, at the time of writing, there is still uncertainty as to the exact day of issue. Towards the end of last week, official cognizance was taken of the various "forecasts" of the report which have been published; and it was authoritatively stated that they are inaccurate and misleading. There are, however, several grounds for saying that, as a result of their long and patient examination of the problem, the Commissioners take a grave view of the economic position of the coal industry. This it is thought desirable should be said, inasmuch as it cannot be supposed that after the report has been issued all will be plain sailing. No illusion as to this exists in the minds of the Commissioners; for they know now better than they realized before their sittings commenced, the difficulty of finding an acceptable solution of the problem.

The Irrepressibles.

Posted from Birmingham, Paddington, and Eastbourne, we have a fresh collection of prospectuses issued to gas stock and share holders by the promoting group with which the name of Eaton and the address of 43, Cannon Street, are inseparably associated. New directors and new addresses may be obtained; but there is always something in these documents which enables those who know their character so well to detect the real seat of origin. Prospectuses have recently again been addressed to large numbers of shareholders in gas companies, including ladies. With a new date attached, we have our old friend the Heathfield and Waldron Gas Light and Coke Company prospectus; and the Southern Counties Electric Light and Power Supply, Ltd., has also come to the surface once more. Both these promotions have been subject to severe criticism in the "Journal;" but, severe though it has been, more could have been said regarding them, and not of a character which would have induced support by subscription of capital. The repeated issue of the same prospectuses shows that these people endeavour to obtain subscribers for their "capital" in easy stages; if they are not successful in placing the whole of an issue immediately, they peg away until they succeed in reducing the balance. Hence the repetition of circulation, and not always in new quarters, seeing that some of our correspondents have had copies of practically every issue made of the prospectuses. Our regret is that well-established gas companies do not circularize the holders of their stock and shares, urging them, if they have any doubt on the subject, before subscribing for capital through invitations of the sort to which we have referred, to consult the general manager or secretary of the company in which they already hold capital, and of which they have good knowledge.

The Chancellor's Optimism.

In his speech at Belfast last week, the Chancellor of the Exchequer had much to say on national economy; and he strongly rebuked the pessimists who are constantly traducing this country by referring to its deplorable financial state. He says this is not true, and to say it is unpatriotic. As a matter of fact, he regards the present financial position, considering all we have gone through, as thoroughly strong and sound. Respecting the coming Budget, last year he budgeted for a surplus of a little more than £1,000,000; and he has every expectation that this will be realized, if the unexpected coal subsidy is not included. The subsidy will thence emerge as a net deficit of £17,000,000 or £18,000,000 sterling; and this, for the time being, must be met out of temporary borrowing. Among other interesting points, he mentioned that last year we imported £40,000,000 worth of oil, which almost neutralized the £50,000,000 of exported coal. Mr. Churchill has always been a strong advocate of the Government dealing with the electricity supply problem; and his limited knowledge of the matter leads him to emphasize the vital importance to our future of the liquefaction of coal and the application of electric power on a gigantic scale. He claims that the arrangements and proposals of the Government in these directions have advanced to the point of practical action. It is perfectly evident that Mr. Churchill is minus much knowledge of the ratio of coal use to power and heating energy provision the electrical way, and the bad effect any abnormal extension of this would have upon national economy.

Working in the Coal Industry.

Interest attaches to the report regarding the coal industry for the quarter ended December last. It will be remembered that in September there was a slight recovery in the condition of the business of the coal industry. This gained considerable impetus as the year moved on; and in December the position was comparable in nearly all respects, except prices, with that which obtained at the beginning of the year. Some of the pits which were shut-down during the depression were re-opened; and nearly 28,000 wage-earners were restored to employment during the December quarter. In the three months, the saleable coal raised amounted to 63,784,100 tons, which compared with 56,392,100 tons in the preceding quarter, and 66,044,500 tons in December, 1924. The average number of wage-earners employed in the December quarter was 1,067,600, as against 1,049,200 in the September quarter, and 1,141,500 in the December quarter of 1924. As a matter of fact, by the end of December the number of wage-earners had been raised to 1,084,300, excluding clerks and salaried persons; but including them the average number of persons employed in and about the mines during the quarter was 1,088,000, or 29,000 less than at the outbreak of war. During the third quarter of last year, the output of coal was 17·88 cwt. per man-shift worked, as compared with 17·33 cwt. per shift in the corresponding quarter of 1924. The estimated average earnings of workers of all classes and ages were 10s. 5¼d. per shift, or ½d. more than during the previous quarter.

PERSONAL.

We learn from the "Co-Partners' Magazine" of the Gas Light and Coke Company that Mr. J. LISTER GODLEE has retired from the post of Deputy Governor of the Company, but will retain his Directorship. Mr. HENRY WOODALL has been elected Deputy Governor in his place.

An interesting event took place at the Carlisle Corporation Gas-Works, Rome Street, on Wednesday, March 3, when about ninety of the employees entertained at tea Mr. JOSEPH P. BUCK, J.P., on his relinquishing the post of Chairman of the Gas Committee. Advantage was taken of the occasion to present to Mr. Buck a gold-mounted walking stick subscribed for by the employees. In handing over this memento, Mr. J. E. Blundell, Gas Engineer and Manager, voiced the feelings of those present by expressing their respect and regard for Mr. Buck, and their appreciation of the kindly interest he had shown, for so many years, in all the staff and workmen. They deeply regretted that ill health and peremptory doctors' orders had compelled Mr. Buck to sever his official connection with the gas undertaking, and wished him a speedy and complete recovery. In returning thanks, Mr. Buck expressed his sorrow at having to give up work in which he was so deeply interested, and reminded those present that his experience of gas matters dated back to his youth, when he had charge of a small gas plant at the works of his firm at Dalston. He was keenly appreciative of the good relations which had always existed between the Gas Committee and their employees. He paid a special tribute to the zeal and capability of their present Engineer. It had been a great pleasure to collaborate with him in the carrying out of the new works, of which he was very proud. During the proceedings, Mr. Buck was warmly congratulated on the honour about to be conferred on him in the bestowal of the Freedom of the City.

Mr. R. J. REW, of the Devon Gas Association, has been appointed Consulting Engineer to the Ashburton Urban Council.

Mr. HAROLD E. BENNET, one of the Directors of Messrs. Alder & Mackay, Ltd., was, on the 2nd inst., married at Brigsley (Lincs.) to Monica, only daughter of Dr. Wm. Escombe, M.R.C.S., of Grimsby.

The recently-formed syndicate which has purchased the Pelaw Main Colliery properties has appointed Mr. ARTHUR KELLY as Fitter. Mr. Kelly has been quayside representative for Messrs. W. Benson & Son, Ltd., of the Montagu and Fourstones Collieries, for many years, and is well known in commercial circles. He represented the Coalowners' Association on the Council of Tyneside Shippers and Lighter-Users' Association, and has also acted as Secretary for the Tyneside Firebrick Manufacturers' Association.

At the last Council meeting of the Institution of Structural Engineers, Mr. A. D. YOUNG, of the Burnley Gas Department, was elected an associate member.

ELECTRICITY SUPPLY MEMORANDA.

INFORMATION from parliamentary quarters leads to the expectation that the text of the Electricity Bill will be available in a few days; but the prophets believe that a second reading will not be sought for nearly another fortnight—probably on March 23. Then the band will begin to play; and the Government will no doubt promptly learn that all the ideas with which they have been fed as to magnificent results issuing from their scheme are not accepted by men with a greater capacity for judging these matters than they possess. It appears, too, that the Electricity Commissioners will come in for some amount of attention. One parliamentary writer says: "Meanwhile there is a certain amount of uneasiness among supporters of the Government regarding the extent to which it is believed the Electricity Commissioners are to be the determining authority under the scheme." There is little question about their determining position; and if there has been any impression that the proposed Central Board would be clothed with far-reaching executive powers, and be in a position to deal unmolested with practically any questions affecting the generation and distribution of electricity, that is a mistake which certainly ought not to have arisen after Mr. Baldwin's Birmingham speech. It is stated that the fear has gained ground that the Central Board will be to a great extent subservient to the Commissioners; and if this proves to be the case, the proposals of the Government will be challenged on the Ministerial side. As a matter of fact, the whole of the work of the Central Board will be subject to the endorsement or otherwise of the Commissioners—that is, if the Prime Minister had fair knowledge of the scheme which he adumbrated. In effect, it seems to us the Central Board is nothing more or less than a screen to the intended bureaucratic control of electricity generation and distribution. Through that screen most electrical men have been able to penetrate.

The Bill.

Value of Large Consumers.

In an article which Mr. J. Rutherford Blaikie has contributed to "The Electrician," he makes out an extremely good case for research into the question of the costs of electricity supply in different circumstances. It is pointed out that the Government proposals divide the subject into two parts—generation and distribution. Naturally the greater the concentration of generation, the larger becomes the distribution system, and therefore the costs and losses associated with it. An important matter is to ascertain the actual conditions which will lead to a reduction of cost to consumers, because there is not much point in saving generating costs unless there is certainty that the extra charges associated with distribution will not absorb the saving. A large amount of weight is given in some quarters to the economy of coal which would result from the concentration of the provision of electricity supply for the country in a comparatively few generating stations. From the consumers' point of view, the insistence upon the effect of coal saving is absurd. Coal does not often amount to more than 20 p.ct. of the total costs, and in some cases it does not reach more than 14 p.ct. Therefore, as Mr. Blaikie observes, coal is not a matter of great importance. Then again, we have the load factor thrown at us on every conceivable occasion as representing something highly influential in working costs. There is no doubt this is true up to a point; but then we have, opposing the placing of too great a weight on this influence, the fact that there is a large variation in cost at different stations, although the load factors are almost identical. Mr. Blaikie asks what causes this; and he gives as the most likely one the proportion of large consumers that a station possesses. One can appreciate that there is an enormous difference per unit of consumption in the capital cost of mains, meters, &c., between the supply of large, as compared with small, consumers. Later in the article, the author makes a comparison between Liverpool and York; and it is notable how comparatively little difference there is between the total works costs at York with its output of 14·9 million KW.-H. sold, as compared with Liverpool with its 154·7 million KW.-H. sold. In both these cases the consumers are of about the same average size—viz., Liverpool, 3880 KW.-H. and York 3910 KW.-H. respectively (1924 accounts). At the same time, Liverpool has more than ten times the output of York. In the case of Liverpool, the load factor for 1925 was 32·12 p.ct., as compared with 30·54 p.ct. for York. The average price obtained in both cases was 1·58d. per unit. Therefore York with its small output has an average price precisely the same as Liverpool with its large output. In the Liverpool case the coal cost per KW.-H. sold was 0·29d., while in that of York it was 0·33d.—the total works costs (including coal, oil, waste, water, wages, repairs and maintenance, rent, rates and taxes, and management) amounted to 0·74d. in the case of Liverpool, and 0·88d. in that of York. These instances and numerous others pretty conclusively show that output is no criterion of the price to be expected. As Mr. Blaikie says, quite small stations are found side by side with the giants, if they are fortunate enough to possess a few large consumers. From the point of view of general utility, the large station, with a small average consumption per consumer such as Glasgow, might (the author says) be considered as more creditable, though the cost is slightly higher than in the case of those which have just skimmed the cream of their working area. These are matters which invite investigation in connection with the Government scheme. Another direction in which Mr. Blaikie suggests investigation is as to whether any substantial reduction in the cost to the consumer has been effected by the interconnection of stations. In such cases there is, of course, the extra charge on mains to be set against the saving in spare plant and an improvement in load factor.

Electric Cooker Faults.

In an article dealing with electric cooker progress and maintenance in Croydon which has appeared in the "Electrical Times," some interesting data are given as to the faults which come under the head of maintenance. In the case of a gas cooker, there is nothing which can fail in the same easy way as in an electric cooker. With the gas cooker periodical cleaning and a rare replacement of parts are all that is required. We have had gas-cookers in use for years without any trouble, inconvenience, or repair. It is stated that in Croydon the average cost of electric cooker maintenance is "placed" at £1 per cooker per annum. But nothing appears to be allowed

in this for supervision, transport, and general establishment charges. However, the £1 is looking at the matter from the point of view of the electricity undertaking; the point of view of the electricity consumer is the inconvenience he suffers. And some users of electric cookers are more unlucky than others. There is a beautiful uncertainty as to when a fuse will go, or something else will happen to cause trouble. The following data from the Croydon experience as to the distribution of faults with three types of electric cookers are interesting:

Type F Cooker.

Number of cookers on supply up to Sept. 30, 1925 . . . 47
Number of days cookers installed. 44,927
Average cooker days = $\frac{44,927}{47}$ = ... 955·8

	Hotplates.	Grill.	Oven.	Total.
Total faults. . . .	355 ..	64 ..	45 ..	464
P.ct. of total . . .	76·5 ..	13·8 ..	9 7 ..	100

Type E Cooker.

Number of cookers on supply up to Sept. 30, 1925 . . . 63
Number of days cookers installed. 41,999
Average cooker days = $\frac{41,999}{63}$ = ... 666·6

	Hotplates.	Grill.	Oven.	Total.
Total faults. . . .	245 ..	32 ..	21 ..	298
P.ct. of total . . .	82 ..	10·7 ..	7·3 ..	100

Type D Cooker.

Number of cookers on supply up to Sept. 30, 1925 . . . 209
Number of days cookers installed. 74,810
Average cooker days = $\frac{74,810}{209}$ = ... 358

	Hotplates.	Oven.	Grill.	Total.
Total faults. . . .	372 ..	23 ..	26 ..	421
P.ct. of total . . .	83·3 ..	5·5 ..	6·2 ..	100

Accumulating all the cookers, troubles, and days of installation, we have the following:

Cookers.	Faults.	Days of Installation.
319 ..	1183 ..	$\frac{161,736}{319}$ = 507

Thus we see that the average faults per cooker equal 3·7 per 507 days of installation. The figures prove the weakness of unreliability. But there is not an average distribution of trouble. As already said, some consumers are more unlucky than others; and vexation and worry are not included in the data. It will also be noted how badly the hotplates behave; and there are a dozen causes of trouble with them. The worst difficulty is through "foreign body" on the highly sensitive elements. Terminal shorts or burning-off is another prolific cause, and so are hot spots.

Discomfort Over Fires.

The electrical people are not at all comfortable just now over the attention that has been given in the public Press to the fire-raising propensity of electrical equipment. But very foolishly, instead of dealing with the matter seriously, they adopt their old-fashioned mode of treating it flippantly. It is not a matter for flippancy. It is something that requires to be handled in a diplomatic manner, and in a way which will displace doubt by confidence among people who have themselves had experiences or incipient troubles which they know full well were due to fusings or leakages through the perishing of, or injury to, wiring installations. The detection of these small troubles before much damage is done does not remove the feeling and the knowledge that such happenings—if they develop in the night, or when premises are left, or in unvisited rooms—would be the cause of greater trouble. The conditions in some of the mansions which have been destroyed are just those which would favour such a development. In "The Times" and in prominent provincial papers, there has been much correspondence on the subject; and the electricity industry ought to be grateful to those writers who have stated that, where wiring has been in existence a number of years, it should be renewed. But instead of gratitude to such advocates, they are reviled, not because their advocacy is not of the right order, but owing to the fact that the electricity industry is afraid that the publicity will make a nasty and lasting impression on the public mind. In our view the contribution that the advocacy as to re-wiring would make to the protection of the interests of electricity undertakings is overlooked; the work that it would put into the hands of electrical contractors is ignored; the demand that should be created for new wiring and fittings should help the profits of the manufacturers of such things. At the same time it should promote better supervision of electrical equipment in the houses of consumers, in order to realize the highest standards of work; it should assist also to put a brake on those electricity suppliers who believe that even cheap and shoddy equipment is justified if it brings new custom to electricity. Of course, some of the writers in the electrical Press have got very much inflamed over this matter; and one at least has accused the gas interests of utilizing these fire catastrophes for their own ends. "Meteor" of the "Electrical Times" says: "Needless to say the slander in question emanates from that sympathetic industry to which some good innocent souls are asking us to hold out the hand of friendship and co-operation." Will "Meteor," who never misses an opportunity of saying harsh and calumnious things about gas, give us proof of the charge he makes, by telling us where he has seen any use made, in public avenues, by the gas interests of these fires in country mansions for the purpose of advancing gas business? If so, we should dearly like to have chapter and verse.

Failures.

There have been many breakdowns of electricity supply during recent months; and some of the largest and best appointed electrical districts have not missed the inconvenience. Liverpool not long since led the way, and Sheffield followed. Since our last reference to a cessation of supply in the latter city, another has happened, as recorded in the local papers for Feb. 11. It was perhaps fortunate that this occurred after midnight; but there was great inconvenience in the High Street through motorists and pedestrians suddenly finding themselves transferred from light to darkness. Among other places, the police office suffered; and red warning lamps had to be placed at the top of Angel Street, which was a dangerous turning into the darkness. Since then Birmingham has been treated to a double event in this way. The local papers for Feb. 26 reported a temporary failure in the central part of Birmingham. The first trouble was early in the afternoon; and the performance at the theatre and several cinema houses had to be suspended, while various business premises were also affected. At dusk a second failure occurred; the same parts of the city being involved—particularly New Street, Corporation Street, and the adjacent thoroughfares. Fortunately, the streets are lighted with gas, so traffic was not interrupted. Tradesmen who had an alternative agent in gas heartily congratulated themselves on their prevision. During the terrific gale on the 3rd inst., the town of Corwen was deprived of electric light, which considerably perturbed the residents who use it, hotel keepers, and the proprietors of cinemas. The gale also interfered with the electricity supply from the Dolgarrog power station. Although there was no actual breakdown, considerable local interruption was experienced. At Southport there was a sad fatality. An electric wire was blown down, and a boy, named John Morton, aged 10, came in contact with it, and was electrocuted.

FORTHCOMING ENGAGEMENTS.

March 11.—Midland Association of Gas Engineers and Managers.—Annual general meeting at the Imperial Hotel, Temple Street, Birmingham, at 2.30.

March 13.—Scottish Junior Gas Association—Eastern District.—Visit to the Carnoustie Gas-Works.

March 13.—Wales and Monmouthshire Junior Gas Association.—Visit to the works of the South Wales Power Company, Treforest.

March 18.—Murdoch Lodge No. 3480.—Installation meeting.

March 18.—Southern Association of Gas Engineers and Managers (Eastern District).—Meeting at No. 28, Grosvenor Gardens, S.W. 1.

March 23.—Southern Association of Gas Engineers and Managers.—Annual general meeting at the Hotel Cecil.

March 24.—Evening Star Lodge No. 1719.—Installation meeting.

March 26.—London and Southern District Junior Gas Association.—Meeting at Westminster Technical Institute.

April 2.—North British Association of Gas Managers.—Annual spring meeting at Motherwell.

April 13.—National Gas Council.—Meeting.

April 13.—Federation of Gas Employers.—Meeting.

May 5.—Society of British Gas Industries.—Annual general meeting at the Hotel Cecil, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P.

May 6.—Eastern Counties Gas Managers' Association.—Spring meeting at Ipswich.

May 13.—Midland Association of Gas Engineers and Managers.—Spring general meeting at Dudley.

May 14.—"B.C.G.A." Conference at Buxton.

May 18.—"B.C.G.A." Conference at Wallasey.

EXAMINATION AND EVALUATION OF COALS FOR CARBONIZING PURPOSES.

By Geoffrey Weyman, D.Sc.

If any excuse is required for entering into a detailed discussion of the evaluation of coal, it may be obtained in the existing state of uncertainty of supply, and in the remarks made in the "Gas Journal" of Feb. 4, 1925, following a paper read by F. J. Jackson, of Sheffield, and other references to the importance of attaching a definite and comparable value to the results obtained from the examination of coals.

The use of an "s" at the end of the word coal was, no doubt, introduced by the housewife as expressing her idea of a number of pieces of coal; possibly also of their variation in properties. Technical experience suggests that its general use to indicate the fact that there are many varieties of coal would be of general advantage. For convenience, the word "coal" will be used to designate that emanating from a particular source, and popularly supposed to be more or less uniform in character. The definite plural will indicate the common bituminous products of our coalfields.

Variation in Coal and Carbonizing Conditions.

Before passing to methods of examination and evaluation, it is as well to consider the inherent difficulties. Far from consisting of a single substance, a piece of coal has been shown to comprise several types of substances—such as fusain, durain, clarain, and vitrain—most of which can be resolved into particles bearing traces of the wood from which the coal was derived. Even a single piece can be described as a "stratified mass of mummified plants (which have in part suffered arrested decay to varying degrees of completeness), free from all save a very low percentage of other matter. Vein partings, &c., which are found in nearly all coals, are local impurities, and are not part of the coal itself."* One is faced from the start by the fact that not even a single piece of coal is homogeneous. The evaluation is complicated, not only by this variation in the same and in different coals, but also by the fact that a coal may be used for more than one purpose by virtue of different properties.

When coal is carbonized, there is more than one product; there are many products which are valuable on account of quite different characters. A coal yielding much ammonia cannot be entirely valued on a thermal basis, as one, at least, of the products has no thermal value. In addition to the differing characteristics of the products, the quantity and the quality of the products may be very different in two coals. It is not sufficient to obtain knowledge of the total yield of products to be expected from a coal; it is necessary to know the yield and quality of each product. There is very little relation between the yields of different products or between their respective qualities. It is true that the coals which yield most gas usually give low yields of coke; but the gas yield may be of high or low quality gas.

Carbonization Costs.

A most important factor in evaluation which has hitherto been neglected is that which depends on the time and trouble that must be expended in obtaining the products. It is known, and fully realized by those in charge of plant, that some coals are more easily and quickly carbonized than others; but it by no means follows that the more easily carbonized coals give the largest amounts and the more valuable products. A coal of the steam coal type can be carbonized with very little trouble; but it does not usually pay to carbonize such coals, owing to the fragile powdery coke which results. Again, it must be remembered that the results of carbonization also depend very largely on the conditions under which the coal is carbonized, and these vary according to the particular carbonizing plant in use, and to other local conditions which accentuate the value of one product in relation to another. A coal giving perfectly satisfactory results in one locality may be considered inferior in another. A plant tuned-up to work with one class of coal may deal very unfairly if suddenly called upon to carbonize another class.

Examination of Coal.

In general terms, the primary object of the examination of a coal must be to obtain information as to the yield and quality of the products and the amount of work necessary to recover these. The results must then be evaluated or appreciated. Unless the evaluation is definite and precise, it is of little use to any but the technical. It is of no use reporting "A" coal as a better gas coal than "B." The question is immediately asked: "Is 'A' at 20s. per ton or 'B' at 17s. 6d. going to be the more profitable for our purpose?" Unless the properties of a coal can be summated, the answer is not forthcoming.

So far as is known, there is no coal which can be considered ideal for carbonizing purposes; and it is always necessary to construct a balance-sheet with the advantages on one side and the disadvantages on the other, and attach a value to each. It is evident that the information in the first place will be in the form of quantities and qualities which cannot be directly added together. It is not possible to summate the 24 lbs. of sulphate of ammonia, 15 cwt. of coke, and 13,000 c.ft. of gas which might be secured from a coal; but by giving each its current market value, or a value proportionate thereto, a summation may be made. This procedure is as truly scientific as any expression in mathematics, and is founded on the most fundamental of scientific laws—that of supply and demand—as exhibited in the currency exchange, which is the basis of civilization.

The carbonization of coal is a chemical process, and depends largely on the chemical composition and properties of the coal; but the physical characteristics have an important bearing on the amount of work and time which must be spent on a coal to extract the products, and therefore must affect the valuation. The time of carbonization has a bearing on the products, and depends partly on the physical properties; the latter affect the yields and qualities of the products indirectly.

Now methods of examination of coal can be divided into two sections: (1) Physical, (2) chemical. Physical examination is made as regards size, hardness or friability, and homogeneity. The size is of importance in regard to its influence on the rate of heat penetration. The writer has shown, in a previous paper, that heat is carried into the carbonizing mass largely in the form of sensible heat of the gas evolved from the outside layer or other gases admitted into a retort. If the coal is an aggregate of all sizes down to dust in the relative quantities of each size necessary to fill all the voids, carbonization is so delayed as to be outside the scope of the gas-works. Fine dust, of course, is particularly potent in this respect, and is also liable to add to the costs of handling and charging retorts when moisture is present. On the other hand, with a very dry coal the fine dust is lost in charging horizontals, and, depositing anywhere but inside the retort, becomes a great nuisance and even a danger. Further trouble is caused by dust carried forward by the gas into the collecting mains and tar towers. Large coal has to be broken to the 2-in. cube size generally suited to carbonization; but the cost is very small.

The size of coal is determined by screening tests; each screened portion being weighed. The results are not of great use, as the disadvantage does not depend so much on any particular size as upon the general relationship of the sizes. For this reason the determination of the apparent specific gravity, using a 10-ton truck for the test, is a better index. With unscreened coals, when a considerable proportion will have to be broken, the test should be carried out after breaking, as the figure may alter very considerably with a friable coal. It has also to be remembered that dust content which could be tolerated in a light, quickly carbonizing coal, would be out of the question with a heavy coal in which a thick and strong plastic layer is set up during carbonization.

The hardness is of importance as influencing the size of a coal. Soft coals, even if arriving at the works as screened nuts, contain a fair proportion of dust before getting to the carbonizing zone.

The homogeneity of a coal affects the heat penetration and the properties of the resultant coke. Pieces of non-caking material help in the heat penetration by interfering with the plastic layer, but also tend to ruin the resultant coke. A great objection to gas coke is that certain components can be easily discovered with the naked eye. Coke-oven coke, on the other hand, which is usually prepared from fine coal, is more or less homogeneous to the eye; and although it may contain the same amount of ash as gas coke, the ash is less visible until after burning. The presence of lumps of pyrites is even more objectionable, in view of the strong evidence left in the coke.

Analysis of Coal.

Of the chemical characteristics we can only determine the amounts of the elements present, and of certain groups of substances present, or inferred to be present. We have not sufficient knowledge of the constitution of coal to determine the way in which the elements are really present—the chemical grouping which actually determines the properties of the coal and what will happen to it when carbonized. It is to be supposed that investigation of this fundamental question is the chief object of the Fuel Research Board. In the meantime we can examine coals in various ways and assume that they will behave in a similar manner to examples of which we have already had experience under large-scale conditions.

Ultimate Analysis.

The determination of the quantity of the chief elements present, carbon and hydrogen, can be carried out by the combustion-tube method, weighing the carbon evolved on combustion as carbon dioxide, and hydrogen as water. Nitrogen is estimated separately by the Kjeldahl or Dumas methods, sulphur by the Eshka method or following the determination of the calorific value in a bomb calorimeter. Arsenic and phosphorus are usually the subject of separate estimations. The oxygen figure arrived at by difference is too inaccurate to be of any

* Stopes and Wheeler, "The Constitution of Coal."

TABLE I.—*Distribution of Thermal Value, Sulphur, and Nitrogen in the Products of Carbonization.*

Durham and Northumberland Coals.

Coal	A.	B.	C.	D.	E.	F.	G.
Calorific value of coal, B.Th.U. per lb.	13,750	12,370	13,460	13,700	13,860	13,520	13,580
P.ct. on total of coal	100·0	100·0	100·0	100·0	100·0	100·0	100·0
,, in coke	58·5	56·20	64·06	59·34	59·54	64·71	63·22
,, in gas	..	24·49	23·08	22·10	21·21	22·62	21·51
,, in tar, liquor, and difference	..	19·31	12·86	18·56	19·25	12·67	15·27
Sulphur, p.ct. in coal	1·60	1·18	1·90	1·113	1·780	2·52	1·32
P.ct. of total in coal	100·0	100·0	100·0	100·0	100·0	100·0	100·0
Volatile on carbonization	60·63	42·38	55·26	36·48	32·03	30·56	23·48
Left in coke*	39·38	57·72	44·73	63·52	68·00	69·44	76·52
Volatile in coke on combustion (by diff.)	30·00	45·76	37·37	56·06	62·61	62·30	68·18
Fixed in ash	9·38	11·96	7·36	7·46	5·39	7·14	8·34
Nitrogen, p.ct. in coal	1·31	1·19	1·38	1·356	1·42	1·44	1·16
P.ct. of total nitrogen	100·0	100·0	100·0	100·0	100·0	100 0	100·0
Volatile on carbonization (by diff.)	14·51	26·05	24·64	26·86	20·43	35·69	24·14
Left in coke	85·49	73·95	75·36	73·14	79·57	64·31	75·86

* In some cases arrived at by difference.

value, particularly as the oxygen content of a coal is perhaps the most important single factor in determining what is going to be the result of carbonization. The method of estimation described by Foxwell appears to be fairly reliable, and gives, so far as can be ascertained at the moment, reasonable results.

With the possible exception of the phosphorus, all these elements are found distributed in the various products of carbonization; and unfortunately no one can tell what the proportion in any one product will be. Since the value of a constituent varies according to the form it takes and the product in which it occurs, it is evident that the estimation of the total quantity in the coal is not of direct value. Carbon, for example, is more valuable in gaseous form than as coke; hydrogen is probably of greater use in the tar, liquor, and coke; nitrogen has no value in the gas or coke, but is of importance when combined with hydrogen as ammonia in the liquor. Sulphur is generally of negative value, but when evolved as hydrogen sulphide it can be easily removed, and its recovery made at times a source of revenue; when in other forms, it causes a distinct loss of revenue. Oxygen when evolved as water is a sign of the waste of an equivalent of hydrogen; in the form of carbon monoxide it is useful as keeping an equivalent of carbon in the gaseous form; as carbon dioxide it is worse than useless; while as oxygenated compounds in the tar it becomes a source of revenue. In order to exemplify the manner in which sulphur and nitrogen are distributed in the products of coal, a comparison is made in Table I.

Consideration of the figures shows that little reliance can be placed on the total thermal value or amounts of sulphur or nitrogen existing in the coal as indication of the amounts likely to be obtained in the products. It is very probable that the physical state of the coal during carbonization, and the method by which heat is conveyed into the mass, determines, to some extent at least, the form in which the elements sulphur, nitrogen, &c., are liberated; and though the external conditions of temperature and pressure can be controlled, there is no means of regulating the internal conditions of the carbonizing mass, which depend on the composition and characteristics of the coal introduced.

Some idea of the form in which sulphur will appear may perhaps be obtained by an extension of analysis to determine the form in which it exists, whether pyritic, or combined with carbon; but the excellent work of Parr and others is hardly far enough advanced to give precise quantitative data, though it is a significant step in that direction.

The inorganic mineral matter in coal—ash—is well known to be objectionable, not only as diminishing the proportion of carbonaceous matter present in a coal, but as leading to inefficient utilization of the coke produced. The presence of ash has an effect on the rate of heat penetration by reducing the continuity and consistency of the plastic layer, and may be beneficial from this point of view. The structure of the coke is consequently affected. R. Lessing has suggested that the ash exercises a catalytic effect in actually promoting the decomposition of the coal complex and the hydrocarbons resulting from initial decomposition. The evidence of this does not appear very strong; and it is impossible to dissociate any such effect from that consequential on a difference of rate of heat penetration. A variation of ash in a coal of the same origin does not appear to influence the yield and quality of the gas, which remains substantially constant within considerable limits of ash content. The point is of some importance; and Table II. is given as an illustration.

Several investigators have noticed that the same phenomenon occurs in the results from the determination of the volatile matter in coal. It is unfair to test the point by adding various amounts of extraneous ash to a given sample, as it can never be incorporated in the coal in the same manner as the original ash. Ash liberated or present extraneous to the coal substance is known to influence the secondary reactions which follow the actual decomposition of the coal substance. Both iron and

TABLE II.—*Relationship of Ash, Volatile Matter, and Therm Yields*

Durham and Northumberland Coals. Results of Tests on 24 Samples of Coal. Coal A.

Ash.	Average Ash.	Average Volatile Matter.	Average Therms per Ton.
	P.Ct.	P.Ct.	
Between 7·0– 8·0	7·36	30·18	70·4
,, 8·0– 9·0	8·36	29·77	69·7
,, 9·0–10·0	9·56	29·67	70·0
,, 10·0–11·0	10·48	29·29	70·1
Above 11·0	13·46	29·99	69·8
Results of Tests on 20 Samples. Coal B.			
Between 6·0– 8·0	6·88	34·62	71·9
,, 8·0– 9·0	8·5	36·15	70·8
,, 9·0–11·0	10·42	34·40	70·8
,, 11·0–13·0	11·83	34·55	70·4
Above 13·0	13·93	34·03	70·5

The results are typical of many obtained from samples representing large consignments of coal from the same colliery. The ash and volatile matter have been determined by the standard American method; the therm yields per ton from coal tests on $\frac{1}{1000}$-ton scale plant.

silica enter into the water gas reaction; the silica emerging in a gaseous form which is not definitely established. Iron also is carried in gaseous form out of a carbonized charge which is subjected to the action of steam. Owing to its far-reaching effect on refractories, and taking also into consideration the serious trouble usually experienced in using coke containing a large amount, iron is to be regarded as a very objectionable ingredient of coal. Another constituent, lime (when present, barium), deserves special attention by reason of its retention of sulphur in the ash of the coke, with consequent reduction of that volatile on carbonization and on combustion of the coke. It is some time since it was proposed to add lime to coal in order to reduce the sulphur and increase the yield of ammonia, but the results from the process are worth bearing in mind.

The analysis of the ash is always of interest; and accumulated results might lead to conclusions of importance. The ash as analyzed does not, of course, correspond to the form in which the constituents are present in the coal; and for really informative work the intrinsic ash should be dealt with separately from that present as extraneous impurity.

Having considered briefly the meaning to be attached to results of the estimation of the elements present in coal, we are forced to the conclusion that unless the amounts in the various products derived under known conditions are also estimated, the information is so incomplete as to be practically useless.

PROXIMATE ESTIMATION OF CONSTITUENTS OF COAL.

Consideration may next be given to examination of coal in which the endeavour is made to estimate groups of constituents either in the coal substance or after low-temperature treatment. It is possible by use of the microscope and by visual examination to pick out certain portions of a coal—for example, fusain, the proportion of which has undoubtedly a far-reaching effect on the yield and quality of the products—but as a practical routine operation to be applied to all coals the method is impossible, as the division is not complete in any sense of the word. The method is of considerable value in determining whether separate consignments of a coal are really coming from the same source and can be presumed to be of the same general character.

Extraction of certain portions of a coal by phenol or pyridine appears to resolve the coal into portions having different properties; but the division is not very definite, and the controversy which has arisen as to the relation of these portions to the coking power of a coal, and what they represent in the

products, leaves the method without much practical value at the moment.

DIRECT TESTS FOR CALORIFIC VALUE, &c.

There are in addition one or two other methods for the direct examination of coal with a view to arriving at a value in certain respects. The calorific value of a coal as determined in a bomb calorimeter is no criterion of the distribution of thermal value in the products, as will be seen from the results in Table I. Taken in conjunction with the volatile matter as determined in a proximate analysis, more valuable information is obtained. Coals which possess a high volatile matter and a high calorific value can be relied upon to give good results; while, if the volatile matter is high and the calorific value low, the coal is to be regarded as of little use, for, though it is easily carbonized, the gas will probably be of very low quality, and the coke may be too fragile for commercial disposal. These two tests taken in conjunction provide the simplest form of examination which is at all reliable. A somewhat similar method of examining the suitability of a coal for gas making is to ascertain the calorific value of the volatile constituents as proposed by Mezger and Muller or by Cheeseman.

Tests may also be made for the agglutinating value or binding power of a coal. The value of such tests lies in the purpose for which they were originally devised—that is, to ascertain in what proportion a coking coal may be mixed with lesser caking varieties to produce a coherent coke. Or, again, tests for ascertaining the behaviour of coal in certain directions—for example the writer's method of determining the rate of heat penetration by means of the rate of gas evolution, or Foxwell's method of ascertaining the pressure differences set up during carbonization—may be applied.

TESTS INVOLVING CARBONIZATION.

The next group of methods of examination comprises those which are more or less in imitation of practice, and involves the process of carbonization. First there is the almost universal proximate analysis, which when carried out by the standard American method is the most useful single test to apply to coal. It serves to give a rough indication of the type of coal, and when carefully carried out with former experience as a guide gives a shrewd idea of the difficulties likely to be met in carbonization, and some measure of the coke yield. Further, the total weight of oxidized mineral constituents is obtained; and if a prior separation of extraneous ash has been made, the test will tell whether the coal has been effectively cleaned, and how far it is possible to expect ash reduction in the coal. A comparison of the colours of the ash gives information as to the iron content and possible clinkering difficulties.

For actual valuation purposes, however, the results are indefinite and incomplete. (Compare Tables II. and IV.) It is not sufficient for a gas coal to yield a heavy weight of volatile matter when a considerable proportion of it might be in the form of carbon dioxide and water. It is true, as mentioned above, that direct determination of the calorific value is an excellent check, and shows whether the coal is of an oxidized character; but a coal might give satisfaction in both respects and still yield a poor coke.

Modifications of the method and apparatus for the proximate analysis can hardly be recommended, as nothing is gained and the simplicity is lost.

In order to ascertain the type of coke which would result, it is useful to carbonize 1 lb. or more in a large crucible under standard conditions (after Roberts), which are carefully regularized to give satisfactory results with a known coal. The coke button can then be cut and mounted by the "plaster of Paris" method, as described by E. W. Smith.

The tube distillation method of examining coal can be made to give reliable comparative figures for the yields of volatile sulphur, tar, ammonia, benzole, and the volume of gas. The gas may be sampled and analyzed, and its calorific value calculated. If the benzole has been previously removed, the calorific value can be relied upon as being close to the actual. Careful standardization and operation will give a basis for actual valuation so far as the yields of products are concerned. The difficulties of uniform heating have been overcome in a somewhat complicated electrical heating arrangement evolved by the Koppers Company and introduced into this country by Dr. Smith. The collection and measurement of the gas can be neatly carried out in the apparatus used by the Fuel Research Board.

The method has the fundamental disadvantage that the yields of tar, coke, and benzole are too small for thorough examination as to quality, and it would appear practically impossible to correlate the texture of the coke with that produced on a large scale. No information can very well be gained as to the rate of carbonization. Further criticism may be based on the fact that, as with many other tests, the coal is placed in a cold retort—a feature which is opposed to practice.

It will be realized that the methods of examination of coal are many and varied. While each test gives valuable information in itself, it is informative in one or two directions only. No single method or test provides sufficient data on which to base a valuation scheme. It is obviously impossible to apply all the tests or methods of examination; and without that the valuation is as likely to give a false impression as a true one.

The most promising method is that of tube distillation, which is an imitation of large-scale practice. It remains to magnify the scale to such an extent that the products are available in sufficient quantity for examination as to quality.

(To be continued.)

SPACE-SAVING IN COUNCIL HOUSES.

Abolishing Chimney Breasts.

Striking figures have just been compiled to show the economies in labour, material, and floor-space that are now being made in housing schemes by the use of cast concrete flues for gas-fires and coppers, instead of the orthodox 9-in. by 9-in. chimney.

In a recently-built pair of parlour type artisans' dwellings, the original plans allowed for:

(1) A coal grate in the parlour.
(2) A gas wash copper with galvanized iron flue in the scullery.
(3) A fireplace, across the corner of the room, in each of three bedrooms.

The effect of installing concrete flues of the Nautilus type, and substituting gas equipment, was to eliminate the chimney breasts from the parlour and three bedrooms, and to substitute an invisible and properly-constructed flue to serve the copper. The following were the comparative costs of all materials (including gas grates instead of coal grates) and labour:

—	With Flue Block (Gas).	With Bricks (Coal).
	£ s. d.	£ s. d.
Excavator and concretor	0 6 0	3 4 3
Bricklayer and mason	41 6 2	104 2 3
Carpenter	4 17 0	2 3 11
Smith, plasterer, plumber, and painter	63 16 3	63 6 10
	110 5 5	172 17 3

Total economy in cost—£62 11s. 10d., or 36 p.ct.

The space economy in the parlour alone provided by the elimination of the chimney breast was 47·4 c.ft. of room space and 7·25 sq.ft. of floor-space.

MAIN-LAYING ACROSS A RIVER.

The laying of a 4-in. gas main 9081 ft. long across the Hudson River, connecting Newburgh and Beacon, N.Y., presented a number of problems which are discussed by Mr. G. H. Smith (Gas Engineer, Central Hudson System) in the pages of the "American Gas Journal." The great consideration which rendered the project a desirable one was that of economy. On the Beacon side of the river was a small gas plant, faced with a programme of extension which included the possibility of additional storage capacity—involving an expenditure far in excess of that required for a main across the river.

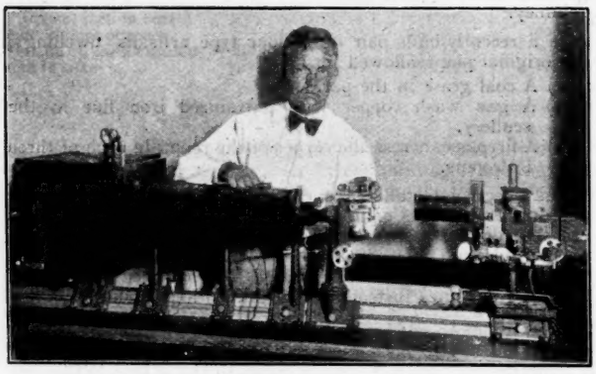
The Hudson River is navigable, and care had to be taken to select a spot for crossing where experience had shown that little anchoring was done. The water in the locality of the pipeline is brackish, and quite salty during periods of low tide; and this matter had to be taken into account in deciding what pipe and coating should be used. On account of its great strength and superior handling qualities, and its cheapness in terms of its relative life, extra-heavy double length steel pipe was specified for the work, for both the land and the river portions. This it was determined should have for a protective coating a bitumastic enamel from $\frac{1}{8}$ to $\frac{1}{16}$ in. thick, which is specially applicable to submarine work. Its durability has, of course, yet to be tested. In the underwater portion of the main little corrosion is expected; but it is anticipated at the shore ends, where the pipe is wet and dry alternately, according to the tides. The experience of a great many companies has been that there is little corrosion under water; but there have been cases of mains being worn thin by sand abrasion.

One of the problems most difficult of solution was with reference to the type of joint to employ; but eventually a screw coupling was decided upon, over which was placed a Dresser clamp with special gaskets. Over the coupling and clamp a cast-iron river sleeve was placed, so as to take the laying strains off the joint, as well as to act as an anchor for the pipe in the bed of the stream. Litharge and glycerine were employed as a joint compound; and in the entire river length of main only one coupling leaked under a 100-lb. per sq. in. air test. For drainage, a drip pot was placed near the short line of the river on the transmitting side, and a drip tank of sufficient size to take the entire accumulation from the river pipe on the receiving side. By trenching, the main was placed deep enough to avoid damage from future dredging operations. The normal pressure on the main is about 15 lbs. per sq. in.

THE ULTIMATE IN SERVICE.

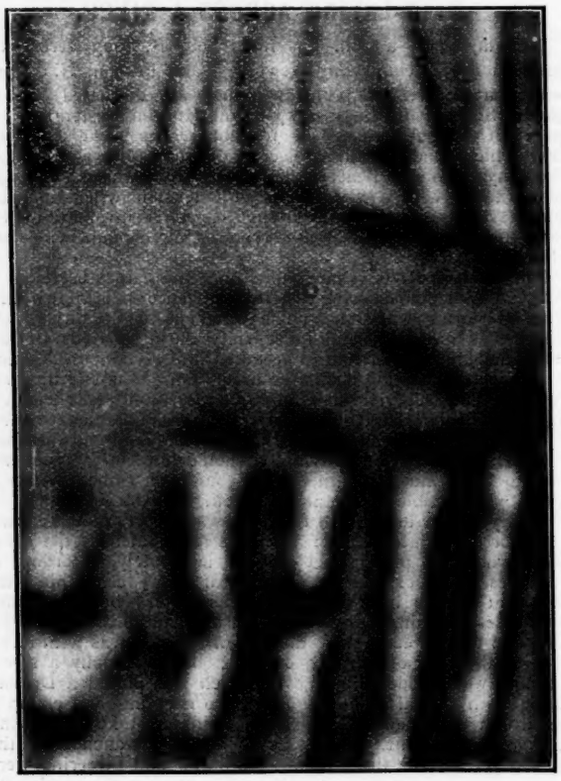
By F. L. BLOCKI, of the People's Gas Light and Coke Company, Chicago.

The Chief Metallurgist to the People's Gas Light and Coke Company of Chicago, R. G. Guthrie, recently established a new world's record in photomicrography—the science of photographing under a high-power miscroscope—when he magnified and photographed a sample of steel 15,500 diameters in a single projection. This is the third successive time Mr. Guthrie has established a new world mark. In these three triumphs he has raised the figure from 11,000 to 12,500, and then to 15,500 diameters.



Mr. Robert G. Guthrie with the instrument with which he established a new world's record for photography under high-power magnification, when he enlarged and photographed the structure of a piece of steel 15,500 diameters.

The feat was widely heralded in professional circles, and attracted the attention of Sir Robert Hadfield, the greatest British authority on metallurgy, and discoverer of the famous manganese steel. Sir Robert, who is also the head of one of the most important steel mills in the British Empire, wrote to Mr. Guthrie, complimenting him upon his achievement, and asking whether he would examine on his machine some samples of Sir Robert's own discovery, which is the toughest steel known.

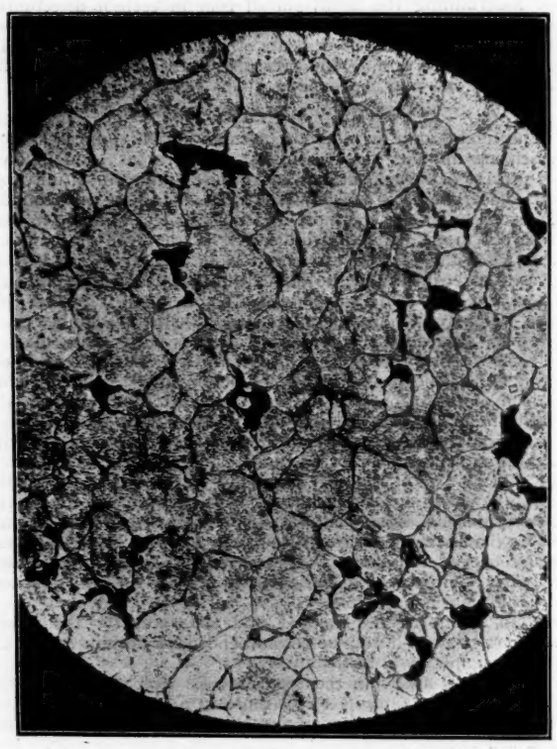


The world's record photograph of the structure of a piece of steel taken at a magnification of 15,500 diameters.

It shows the junction of two grains separated by a boundary of pure iron, which is seen running up the centre of the picture. The black and white lines at the sides are layers of iron and a compound of iron and carbon, actually a few thousands of an inch in thickness, and invisible to the naked eye.

In his work Mr. Guthrie uses an imported apparatus, a Leitz inverted micro-metallograph, capable of separating lines up to 200,000 per lineal inch, a 95-power lens, a 25-power eye-piece, and a camera having a bellows extension up to 42 in. The eye-piece is capable of enlarging up to 2500 diameters without extending the bellows of the camera. If the head of a pin were enlarged 15,500 diameters, it would stretch to 51 ft. across, or wider than a city lot. When in use, the apparatus is suspended on a delicate spring arrangement; and the adjustment is so fine that a vibration of 1/250,000 of an inch is enough to spoil an exposure. The extreme difficulty of reaching, and then holding in focus for the considerable period of time necessary for photography, these infinitesimal measurements explains why this and other records were never before achieved.

Mr. Guthrie and the laboratory of which he is the head afford a notable example of the utmost in service by a gas company for its customers, present and prospective, as well as one of the best means not only of getting new customers, but also of keeping satisfied the Company's present large industrial gas consumers. The fact that Mr. Guthrie is an international authority in his line gives added prestige to his already distinguished service.



An unusually fine photograph of the structure of a piece of hardened high-speed steel.

This can be heated red-hot without losing its hardness.

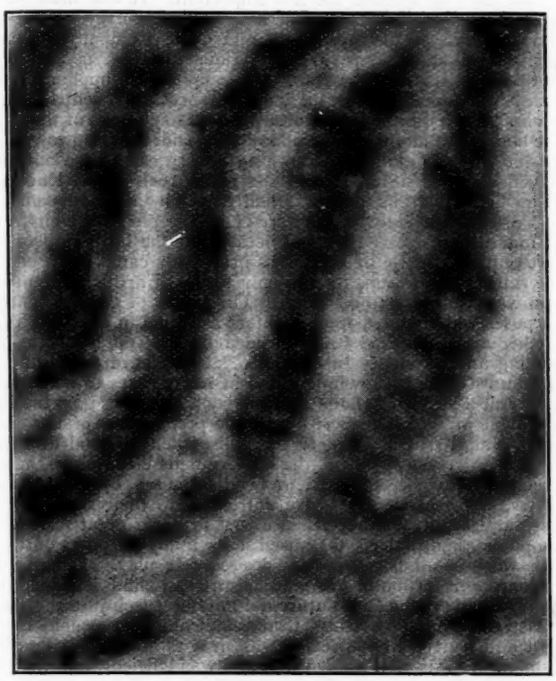
Mr. Guthrie performs many functions for customers of the People's Gas Light and Coke Company, all of which are rendered free of charge. He will delve into originating new processes of manufacture; he will revise old ones, or suggest modifications for either. If a particular product is in need of improvement, Mr. Guthrie will spend weeks in eliminating the difficulties, and will then turn over his findings and recommendations to the manufacturer. If new machinery is needed to fulfil the new requirements, Mr. Guthrie will design it, and supervise its installation and first operation, entirely for the benefit of the customer. In short, there is nothing in the field of metallurgy, from safety pins to locomotives, in which Mr. Guthrie will not concern himself—and all of this is free of charge!

The result? Just this. If Mr. Guthrie solves a problem for a manufacturer who is not a user of gas, that manufacturer will ultimately become not only a satisfied user, but a big booster of gas as well. In many cases Mr. Guthrie has placed at the prospect's disposal equipment which would otherwise be entirely unavailable to him, or which he could not afford. In instances where experienced engineers or metallurgists are already on the ground, Mr. Guthrie may co-operate with them,

lending them the weight of his specialized knowledge and experience.

If the customer is already a user of industrial gas, Mr. Guthrie can make him a better and bigger user in many cases by suggesting means and methods by which greater efficiency can be obtained in manufacture, with a consequent improvement in product, sales, and ultimately gas sales, because of the consequent increased manufacture. This has actually taken place in a number of cases.

For instance, a customer may 'phone the laboratory and explain that his high-speed cutters are not standing up properly, and he may ask for aid. Mr. Guthrie asks for samples, then cuts them in sections, polishes them, etches them, and examines them under his world-record microscope. The resulting photographs show exactly where the trouble is—that the "draw back" temperature is too low. Mr. Guthrie suggests a remedy, and then examines samples of the new cutters made according to his orders, to see that they are all right. The result is increased production and extended use of gas.

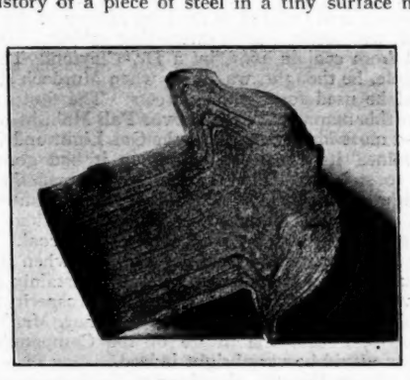


The former world-record photograph at a magnification of 12,500 diameters.

A picture of steel structure showing alternate layers of iron and a compound of iron and carbon. In the sample photographed they were invisible to the eye, and actually a few thousandths of an inch apart.

Another customer says that he is having trouble with his steel because he cannot harden it, and that he thinks his gas-fired furnaces are to blame. Microscopic photography and examination of samples show the weaknesses. A trip to the factory and some expert advice change a kicker into a booster. Industrial gas, instead of being discarded, has won another staunch supporter.

Sometimes Mr. Guthrie's microscopic vision, which can see the life history of a piece of steel in a tiny surface no bigger than the point of a pin, is the means of bringing on success instead of failure for a large and well-established business. A notable example of this kind was the case of a manufacturer who wished to compete with a foreign company in the manufacture of a small metal product. In trying to duplicate this, two other American companies had already gone bankrupt. This company had to succeed or meet the same fate. Mr. Guthrie was called in. He took back to his laboratory a tiny piece of the foreign product, and four domestic samples. He worked 18 hours a day for three months, examining, testing, and duplicating; and he finally announced that, through the aid of his metallograph, he had solved the problem. The process was put into use with apparatus which Mr. Guthrie had especially designed for its manufacture; and the concern now turns out 64,000 of these pieces every forty-five minutes, not only better in quality, but cheaper, than the foreign product. The big thing is that gas is being used to do it.



Why the rivets failed.

The cause of the pits in the head was explained by the extreme curvature of the lines of stress running the length of the rivet, and brought out by the metallograph. This picture furnished the clue for solving the difficulty.

Countless other examples could be cited. Strange as it may seem, though Mr. Guthrie is in the employ of the People's Gas Light and Coke Company, only a small percentage of the volume of work turned out by him is done directly for the Gas Company itself. In all cases it is mainly a question of service to the customer; and service is, after all, the foundation of the gas or any other public utility business. Mr. Guthrie emphasizes this service in a very real way, and thus strengthens the foundation of his Company, in addition to solving many home problems whenever these arise.

PHYSICAL AND CHEMICAL SURVEY OF THE NATIONAL COAL RESOURCES.

Department of Scientific and Industrial Research.

An important aspect of the work on fuel research undertaken by the Department of Scientific and Industrial Research is a survey and classification of the coal seams in the various mining districts by means of physical and chemical tests in the laboratory, supplemented where desirable by large-scale tests at H.M. Fuel Research Station, East Greenwich, or elsewhere.

The Fuel Research Board of the Department consider that the best way to carry out this work is by means of Local Committees representing the local colliery owners and managers, the local branch of the Institution of Mining Engineers, the Fuel Research Board, and the Geological Survey of Great Britain, as well as outside scientific interests. Each Committee is charged with the duty of supervising the work of the physical and chemical survey in a coal mining area; and in this way the survey becomes of practical value from the commencement, since local knowledge and experience are made available, and the seams to be investigated and the general programme of work are decided by those who are able to estimate most correctly the relative importance of the problems to be solved. The seams selected undergo physical and chemical examination by local investigators appointed for the purpose, after which a final selection is made of those seams likely to justify experiments on a technical scale in order to test their suitability for practical uses or methods of treatment.

Committees have for some time been actively at work in the Lancashire and Cheshire and in the South Yorkshire areas. A Committee for the North Staffordshire area was formed last year; and the Department recently appointed a Committee to deal with the coalfields of Scotland. A further Committee has now been formed to deal with the survey of the coalfields of Nottinghamshire and Derbyshire. The Midland Counties Colliery Owners' Association, the Notts. and Erewash Valley Colliery Owners' Association, and the Midland Counties Institution of Engineers are co-operating in this work; and the composition of the Committee is as follows: Mr. H. E. Mitton and Mr. C. W. Phillips, representing the Midland Counties Colliery Owners' Association; Mr. C. H. Heathcote, representing the Notts. and Erewash Valley Colliery Owners' Association; Mr. J. W. Whitaker, representing the Midland Counties Institution of Engineers; Prof. W. H. McMillan; Mr. C. N. Bromehead, representing the Geological Survey of Great Britain; Dr. C. H. Lander (*ex-officio*), Director of Fuel Research; and Mr. F. S. Sinnatt (*ex-officio*), Superintendent of the Physical and Chemical Survey of the National Coal Resources.

The "Evertite" Locknut.—A private Company known as British Evertite Locknuts, Ltd., has recently been registered, with an authorized capital of £30,000, for placing on the market the "Evertite" locknut. Externally this nut resembles an ordinary one, but it has a bevelled end and an annular groove (V-cut) cut within the nut. When the nut is screwed home with the bevelled end in contact with the resisting surface, the reaction causes the groove to yield. A slight but sufficient distortion of the thread then takes place, thereby effecting a positive (or direct) lock upon the bolt. It functions repeatedly, the makers claim, without injury to the thread of either nut or bolt.

NEW SHOWROOMS AT GOODMAYES.

Official Opening of The Gas Light and Coke Company's Service Premises.

To afford adequate facilities and give efficient service to about 14,000 of their customers in Goodmayes and in parts of Seven Kings and Becontree, and to cope satisfactorily with the great expansion of their business in those rapidly growing districts, the Directors of the Gas Light and Coke Company some time ago decided to acquire a new showroom and district office in Goodmayes; and on Friday last, March 5, the premises were formally opened by Sir Frederic Wise, D.L., J.P., M.P.

Expansion of the District.

There has been a rapid growth of population in the area served from this centre, and the demand for gas fittings and appliances has increased much more than proportionately to the number of residents, so that the need for this enlargement of the Company's means for serving the public in the district had become urgent. The outstanding feature in this growth is the springing-up of a new town—Becontree—through the enterprise of the London County Council. Already this township, of which not a house existed before 1921, comprises over 6000 houses, with an estimated population of 35,000. There are about 700 dwellings in course of erection, with more to follow, until, if the Council's plans are fully carried out, a town equal to Portsmouth in population will have come into existence.

Gas in Every House.

Every house in this new town is lighted by gas, each has its gas cooker and one or more gas fires, and many have gas heated hot water circulators as well. To supply these, the Company have had to lay many miles of mains and service pipes, and to invest many thousands of pounds in meters, fittings, and appliances, because the houses being supplied through prepayment meters, all the gas equipment from main to meter is provided by the Company.

Efficient Fittings to Satisfy the Æsthetic.

At the new showroom the public of Goodmayes will find an admirable selection of modern artistic lighting fittings and shades, efficient cooking appliances, fires suited to every style of furnishing and decoration, geysers, circulators, wash-boilers, irons, and other domestic and industrial labour-saving appliances. There also they will be able to make their inquiries, obtain advice on the economical use of gas for any purpose, and pay their bills. In his remarks at the opening ceremony, Mr. Milne Watson observed that it is well known that gas is efficient, and that its use implies coal conservation; but, he suggested, the general public are not aware that it can be employed for all purposes most artistically. A visit to the Goodmayes showrooms will soon show how mistaken are those who imagine that gas does not satisfy the æsthetic sense. The quiet and peaceful effect of the decorative scheme of the main showroom—the colours are grey and white, with rose coloured shades to the lighting pendants—is excellent. In common with the ideas embodied in the recently-opened showrooms at the Seven Sisters Road, Islington, and at Golders Green, sectionalization of the appliances is carried out, with the result that there is not the slightest suggestion of overcrowding, and the consumer is able to concentrate his or her attention on a single piece of apparatus with the greatest possible ease. The main showroom is on the ground floor, and has an admirable window frontage on the Goodmayes Road. At the far end of the showroom is the accounts desk, so that, to pay their bills, consumers have to traverse the length of the room. On the first floor are a well-equipped general office and one or two subsidiary offices, including that of the foreman. At the rear of the showroom and offices is an exceedingly well arranged stores, designed to facilitate the tasks of the workmen. The architects responsible for the design, arrangement, decoration, and furnishing of the premises are Messrs. Austen Hall, F.R.I.B.A., and W. J. Tapper, F.R.I.B.A.

Opening Ceremony.

The opening ceremony was performed by Sir Frederic Wise, who was accompanied by Lady Wise, and supported by members and the principal officers of the Ilford, Barking, and Dagenham Councils, as well as prominent residents in the district.

The visitors were welcomed by the Governor of the Company, Mr. D. Milne Watson, D.L., and other members of the Court of Directors. With the Directors were the Assistant General Manager (Mr. R. W. Foot), the Chief Engineer (Mr. T. Hardie), the Rental Superintendent (Mr. L. M. Simmons), the Chief Officer of Stores (Mr. W. McDowall), and the Deputy Controller of Gas Sales (Mr. Stephen Lacey), Mr. A. W. Palmer (the Inspector-in-Charge of the Goodmayes and Barking districts), together with the other senior officers of the Gas Sales Department, to which is entrusted the task of giving good service to the 1,100,000 consumers in the Company's area.

Mr. Milne Watson said that they were honoured that afternoon by the presence of Sir Frederic Wise, who had kindly consented to open their new showrooms and offices. These were small compared with those which had been inaugurated at the Seven Sisters Road, Islington, and at Golders Green, and with those to be opened in Westminster; but, though they were small, they were none the less important. It was most desirable that each district should have offices worthy of the gas industry and of the Gas Light and Coke Company. Unless there were showrooms in the various districts, people could not become acquainted with the most up-to-date appliances, for many were unable to travel long distances to a central showroom. What they saw that afternoon was symbolic of the work the Gas Light and Coke Company were endeavouring to accomplish. The gas industry had a long history; and the Company, which obtained its charter in 1812, had been in existence 114 years. During this period it had done an enormous amount to raise the standard of comfort of the people in the city, and to make their lives easier and better. At the beginning of the last century the life of the towns practically came to an end at the setting of the sun, for the only forms of artificial illumination were candles and oil lamps. The supply of gas for lighting purposes was the first great step forward; and in course of time further amenities had been afforded by the supply of gas for heating and cooking. In an industrial district of the nature of Goodmayes, the breadwinners had in many cases to leave their homes at a very early hour; and in such instances gas, the employment of which rendered easy the preparation of the early meal, was a real blessing to the housewife. A good deal had been heard recently about the Government electricity scheme, which had to a certain extent been criticized by the gas industry, not because they were unfriendly to their sister industry—far from it, for they realized that it was a great servant of the public, and, indeed, they used it for many purposes on their own works—but because they desired fair play. There was ample room for both gas and electricity; and it would be wholly unfair if the Legislature did anything to injure the older industry. The showrooms would indicate that people could light and heat their houses by gas in a thoroughly up-to-date fashion. It was well known that gas was efficient, and that its use meant that the nation's coal supplies were being conserved; but the public generally were not aware that it could be employed for all purposes most artistically. No one need feel ashamed to instal a gas fire, for example, in a most delicately furnished and decorated apartment. It was necessary to impress this fact on the public mind, for there was always a tendency to follow the latest fashion, which at the moment happened to be electricity, the talk of the town. It was necessary to demonstrate that for most purposes gas could be used more efficiently than, and with equal artistic effect as, electricity. The district around Goodmayes was growing rapidly; and now that the London County Council had bought the large estate at Becontree, the expansion was extraordinary. All the houses on the Becontree estate had gas lighting and heating; and the new showrooms would be of great service. The offices had been designed to add to convenience of the staff in coping with the work, and the stores had been carefully arranged to render the tasks of the workmen easier. He felt sure that the whole building reflected great credit on the architects, Mr. Austen Hall and Mr. W. J. Tapper.

Sir Frederic Wise remarked that unless one happened to be a councillor or a member of Parliament it was hard to realize the enormous amount of expansion which was taking place in the Ilford district, particularly at Beehive and Becontree. Mr. Milne Watson had referred to the long history of the gas industry, which was really a most interesting subject. Gas was first produced from coal in 1691, by a Dr. Clayton. The next important date, he thought, was 1792, when Murdoch showed how gas could be used for lighting streets. The first street to be lighted in this manner in London was Pall Mall, in 1807. Then in 1812—a most important year—the Gas Light and Coke Company obtained its charter, since when it had gone on from strength to strength. They certainly welcomed the Company and its new enterprise in Goodmayes. This country, said Sir Frederic, was not a water-power country; it had to develop through gas and electricity, both derived from coal. Personally he knew little about the Electricity Bill, but when it appeared, as it would do in a short time, he would certainly examine it from a business point of view. He wished prosperity to the Gas Light and Coke Company and to its Governor, Mr. Milne Watson. He hoped that the future of the Company's work in Goodmayes would be very bright indeed.

Miss Kathleen Burrells, daughter of the foreman of the new stores, then presented Lady Wise with a bouquet, following which Mr. Milne Watson proposed a vote of thanks to Sir Frederic and Lady Wise, which was heartily accorded.

After the ceremony, tea was served in the general office. The visitors then inspected the premises.

INSTITUTION OF FUEL TECHNOLOGY.

The Lecture Theatre of the Institution of Civil Engineers, Great George Street, Westminster, was crowded on Friday afternoon, March 5, with leading men of all branches of engineering and chemistry, to discuss the proposal to form an Institution of Fuel Technology, referred to on p. 549 of the "JOURNAL" for March 3.

Sir WILLIAM LARKE, K.B.E. (Director of the National Federation of Iron and Steel Manufacturers), opened the meeting with a general statement of the need for, and the objects of, an Institution of Fuel Technology on national lines, pointing out that when the preliminary inquiries were made among a few of the people interested in fuel economy questions, the response indicated such a widespread interest in the proposal that it was apparent a further and wider inquiry was necessary, of which the meeting on March 5 was the result. Already 400 people had given their unqualified support to the proposal for the formation of such an organization, and 40 had expressed dissent or neutrality. The inquiries made to-date, however, were far from covering the whole field of those interested; and it was intended to reach this wider field when the Organizing Committee, which it was proposed to set up, had been elected. Referring to the already existing Institute of Fuel Economy Engineers, and the generally expressed desire that there should only be one body dealing with fuel problems—and that on the broadest possible national grounds—Sir William Larke said he understood that the governing body of the existing Institute was prepared to support a national movement of this character; and it was hoped that the Institute of Fuel Economy Engineers would be fully represented on the Organizing Committee to be set up by this meeting. It would then be for that Committee to consider ways and means for arriving at such an arrangement as would result in complete unanimity of effort under a single organization. So far as the new organization was concerned, possibly the Iron and Steel Institute might serve as a model; but this would be a matter for the Organizing Committee. Though so many people had supported the proposal to form a national institution of the kind in view, there was, as must be expected, an influential body of opinion which thought it undesirable that a still further technical institution should be formed, and that it was, in fact, premature to go forward with these proposals. So far as the latter point was concerned, Sir William thought the answer was to be found in the response that had been received. At present there was no organization which collated information in relation to fuel research and its practical application to industry, and therefore there was no means of making available to all the experience obtained in the various fields of work. It had been suggested that the field could be covered, or the objects could be met, by the formation of a fuel group in one of the existing institutions. The difficulty, however, was that the membership of any existing institution was necessarily identified with particular lines of work, and the fuel group therein would not cover the whole ground effectively. Even if it could do so as regards the actual work itself, it could not have the wide appeal for membership which a separate fuel organization would have. He believed that when the whole of the details had been investigated, and a scheme put forward, the critics of to-day would become the supporters of to-morrow.

Sir PHILIP DAWSON moved the following resolution:

> That this meeting is of opinion that in view of the national importance of the scientific utilization of fuel, an Institute should be formed having for its general objects the promotion of the efficient production and utilization of fuel, and the co-ordination of work in this country and abroad associated with the scientific utilization of fuel in industry.

In doing so, Sir Philip remarked that, if the proposed Institution was formed, it was the intention to co-operate to the fullest extent with all the existing scientific societies, so that all the available information could be brought to one centre.

Sir RICHARD REDMAYNE seconded the resolution.

Mr. P. C. POPE, representing the Executive of the Institute of Fuel Economy Engineers, said that, while that body fully agreed that there should be only one organization to deal with fuel problems, the objects of the Institute of Fuel Economy Engineers were identical with those proposed for the new Institution; and therefore it was suggested that the existing Institute should be taken as a foundation, and its constitution widened and improved in any manner thought necessary, without actually forming a new body. He therefore proposed as an amendment that a Committee should be formed to meet the Council of the Institute of Fuel Economy Engineers, and get to work on these lines. The Council of the existing Institute would conform to the views of the majority of such a Committee, because they fully appreciated the importance of the problems to be dealt with, and the undesirability of having more than one organization for the purpose.

The CHAIRMAN observed that it was proposed to form an Organizing Committee under a later resolution, and the Institute of Fuel Economy Engineers could be represented on that.

Mr. TOMLINSON LEE seconded the amendment

Mr. LEONARD HARVEY, in the hope of preventing a cleavage at this early stage, suggested that the amendment should not be put to the meeting until there had been a discussion upon the other resolutions.

Dr. M. W. TRAVERS, F.R.S., in the course of a letter which was read, supported the new Institution. He urged that membership of the proposed Institution be as widespread as possible, and that in no circumstances should membership be represented as a qualification to practise in connection with fuel technology.

Mr. DAVID WILSON said it was impossible to support the suggestion that had been received from outside to make such an organization as was proposed a section of an existing institution.

Dr. E. W. SMITH spoke definitely in opposition to the formation of a new Institution. It was necessary to have an organization to do work such as that proposed, but he felt that the quickest way to get results, and the most convenient and cheapest way, was to follow the action taken by chemical engineers a few years ago, when they formed the Chemical Engineering Group of the Society of Chemical Industry. This was an autonomous Group within the Society, and had its own officers and Committee, and published its own Proceedings. As a professional man he deprecated the addition of yet another technical society. He urged that an organization to deal with fuel technology was required, but that this organization should be of an evolutionary character, such as would be possible if a Group of the Society of Chemical Industry were formed. Dr. Smith then read a letter from Prof. Smithells on the subject, in which similar views to those he himself had expressed were recorded.

Dr. R. LESSING said he had been reluctant to have his name placed on the letter that had been sent out, because he also felt that they wanted no more societies. After discussing the matter, however, he thought it would be a good thing to call this meeting, and discuss the whole question. As regards the combination of the proposed scheme with the Society of Chemical Industry, what had been said at the meeting seemed to indicate that such a course might not lead to the goal which had inspired the promoters of the scheme, because there was no doubt that chemists were not the only people concerned. It was certain that some organization was required to deal with fuel from the most comprehensive point of view; and perhaps in the resolution that had been proposed and seconded, the word "Institute" might be substituted by the word "Organization," so as to leave the Organizing Committee as free a hand as possible when it came to discussing the details.

Mr. GEORGE HELPS suggested that what was required was an Institution which could look on the fuel question from a correct angle. They would not get that from a body dealing with any other subject.

Mr. D. BROWNLIE said that last year he was asked to become the President of the Institute of Fuel Economy Engineers, but he did not do so, because he thought that body was not dealing with the subject on the right lines. The idea that the work should be done through the Society of Chemical Industry was ridiculous. He had been a member of that Society for a number of years; and in an excess of generosity he would not say a word against it. The fact was that it had too many activities already, and it could not handle them as they should be handled.

A SPEAKER mentioned that in the letter that had been sent out, the signatories did not contain any representative of the gas or coking industries.

Mr. BROWNLIE said both had been communicated with.

The CHAIRMAN observed that it had been impossible to explore all possible avenues thoroughly in the short time available. He asked Mr. Pope and Mr. Tomlinson whether, in view of what had been said, they would withdraw their amendment, because the second resolution, which was to follow, really met their point.

Mr. POPE said that he would not press the amendment.

The first resolution, moved by Sir PHILIP DAWSON, and seconded by Sir RICHARD REDMAYNE, was then put to the meeting, and carried *nem. con.*

Principal GEORGE KNOX (South Wales School of Mines) moved the following resolution:

> That an Organizing Committee be, and is hereby, elected, to determine the general basis of organization, and to define more specifically the object of the work of the proposed Institution. Such Organizing Committee in the first instance to be representative of the following interests:
>
> Academic, consulting fuel technologists, electrical, mechanical, oil, low-temperature carbonization, and gas engineers, coal-owners, iron and steel manufacturers, and manufacturers of fuel equipment, in the proportion of not more than two members from each. The Committee to elect its own Chairman and to have power to co-opt additional members, but not exceeding in number one-third of the appointed Committee, to assist in their deliberations.

The following names were suggested for membership of the Committee in the first instance: D. Brownlie, Sir Philip Dawson, E. C. Evans, S. McEwen, P. Hambley, L. C. Harvey, Sir William Larke, Dr. R. Lessing, T. S. North, Sir Richard Redmayne, W. M. Selvey, Dr. M. W. Travers, Prof. R. V. Wheeler, D. Wilson, and Admiral Sir Edmund Slade.

The following have given their support to the proposals, but were not present at the meeting, and their views as to willingness to serve have not yet been ascertained: Lord Montague, Mr. Evan Williams (President of the Mining Association), and Mr. C. P. Sparks.

The CHAIRMAN gave an undertaking that the Committee would deal with the appointment of representatives of the Institute of Fuel Economy Engineers at its first meeting, and also the appointment of representatives of geologists, and the users as a body.

The resolution was carried unanimously.

The final resolution, proposed by Mr. C. E. STROMEYER, and seconded by Dr. R. LESSING, was as follows:

> That the Organizing Committee be requested to prepare a report as to the constitution of the proposed Institution and to make recommendations as to the name thereof.

This was carried *nem. con.*, and the meeting closed.

THE TENTH IDEAL HOME EXHIBITION.

Manifold Uses of Gas in the Household.

Until the 27th inst., people who are seeking greater comfort, new domestic ideas, and more beauty—and who is not?—will be flocking to Olympia to inspect carefully the "Daily Mail" Ideal Home Exhibition, which has never been so rich as on the present occasion in fresh features and original suggestions—some of which were indicated in the last issue of the "JOURNAL." Of the general attractions there is no need to say more in this place, except that included in the selection of interesting films shown are the popular Radiation subjects—"An Artist's Model" and "A Happy Ending." From the exhibition itself no one can come "empty away" after an inspection of the 8 acres and more of fascinating displays to be seen there. Our purpose in returning to the subject now is to make readers acquainted with what has been done to ensure that the uses of gas in the household shall not be overlooked. Some idea of the immensity of the service rendered by gas in this connection may be gathered from the statement that in two million homes in Greater London gas serves households in one way or another; and the things which it does are amply demonstrated at the exhibition.

THE LONDON GAS EXHIBIT.

Again this year one finds full justice done to the claims of gas in the joint exhibit of the seven principal London and District Gas Companies—namely, the Gas Light and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the South Suburban Gas Company, the Tottenham District Light, Heat, and Power Company, the Wandsworth, Wimbledon, and Epsom District Gas Company, and the Croydon Gas Company. The arrangements were left in the hands of the following Committee: Mr. F. W. Goodenough, Gas Light and Coke Company (Chairman); Mr. A. Stokes, South Metropolitan Gas Company; Mr. L. F. Tooth, Commercial Gas Company; Mr. W. Wastell, South Suburban Gas Company; Mr. S. B. Chandler, Tottenham District Light, Heat, and Power Company; Mr. C. M. Croft, Wandsworth, Wimbledon, and Epsom District Gas Company; Mr. W. J. Sandeman, Croydon Gas Company—with Mr. J. E. Henwood as Hon. Secretary. As last year, the South Metropolitan Gas Company, at the request of the Committee, made themselves responsible for the erection and equipment of the stand; and right well have they performed the task. The furnishing has been excellently carried out by Messrs. John Barker & Co., Ltd., of Kensington. As the result of these joint efforts, the usefulness and economical advantages of gas in the home are once again fully demonstrated in a highly interesting and extraordinarily complete display.

In its principle features, the exhibit is on the lines of that of 1925; and it occupies the same 1600 sq.ft. of space, in an excellent position in the main hall, just at the foot of the big staircase leading to the gallery. The basis of the stand is a series of open rooms, which, though conveniently arranged on the floor level, include all the apartments of a fully furnished modern house, equipped with the most up-to-date appliances. These open rooms surround a big central lounge, affording unrestricted access to the public, and approached by the main entrance through a miniature garden. In this garden are appropriately placed samples of sulphate of ammonia; and on the outside of the entrance hall there has been fitted two Sugg "Flambeau" lights with silk shades which simulate in a remarkably realistic manner the flames of a torch. The rooms comprise hall, dining-room, bathroom, kitchen and scullery, bedroom, and study, and each is provided with appropriate gas fittings, and decorated in a highly artistic manner. These fittings are so well selected that specimens may be seen suitable for practically any class of home; and all the gas lighting is controlled by pneumatic switches. Visitors will much appreciate the opportunity of resting for a short time in the lounge, which is provided with a number of easy chairs for the purpose.

The new artistic colour schemes designed for this occasion will be specially admired. All around, labour-saving devices are arranged in suitable settings; and housewives will realize that gas places comfort, health, and leisure, together with escape from drudgery and strain, within the reach of every pocket. As last year, a feature of the arrangement is the sacrifice of space at one end to provide a public gangway, backed by a mirror which adds depth to the stand. On either side of the mirror is a large cartoon effectively displaying the names of the seven Companies represented, so that visitors from any particular area covered by one or other of these Companies may feel that in this exhibit they have something personal, and that in a way it is "their own show." Placed in prominent positions about the stand are neatly framed statements according just the information which visitors of an inquiring turn of mind would desire.

A REALISTIC LOG FIRE AND "DAYLIGHT" MANTLES.

Before proceeding to examine the contents of the various rooms, mention should be made of two special "Metro" novelties which are certain to draw to themselves a large amount of attention. The dining room has in it a log fire, the features of which are that it burns with a practically luminous flame, and that it is as close a simulation of an actual wood log fire as could possibly be designed. The logs are of fireclay, and so nearly resemble wooden logs that only the closest examination can reveal the fact that they are an imitation. The use of such a fire is, of course, chiefly decorative—in which respect it stands high. Where there is an installation of central coke heating and hot water radiators, that "cheery effect" so often clamoured for can be obtained in dining or drawing room by the fixing, in a suitable grate, of a fire of this type.

The study and hall, and the top of the stand, are lighted by "Metro" Daylight mantles, which have never before been shown in public. These give a strong, yet soft, illumination closely resembling the natural light of day. It is pointed out that artificial light is not the same as sunlight; colours seen by it appear altered in value. For example, blues appear darker, yellows and reds brighter. The "Metro Daylight" gas mantle corrects this defect, and provides a light which is similar to afternoon sunlight. For this reason, it will give useful service in drapers' and milliners' shops, studios, art galleries, and places where correct colour recognition is of primary importance.

The Hall.—A feature of the hall is the handsome "Metro" stainless steel gas fire, with the customary equipment of pilot light, ash tray, and standard tap fitted with a removable key. The section is lighted by "Metro" burners, and is provided with a Fletcher Russell two-column "Ariel" radiator.

The Lounge.—The lounge is lighted by ten specially designed wrought iron lamps, and two Evered standard lamps. Each table is lighted by a lamp on a china stand. Four types of coke boilers, two steel and two iron, are shown here—the "Glow-Worm," the "Nautilus," the "Ideal," and the "Kokette"—and "Classic" radiators are assumed to be heated by these boilers. One end of the lounge has been set apart for frequent cookery demonstrations, which have proved exceedingly popular. For these a "Metro Balham" eye-level cooker is being used in the first half of the period of the exhibition, at the end of which time there will be substituted for it a National Gas Council "Standard" eye-level cooker. This change-over is a good idea, which will be made to apply to much of the apparatus displayed.

The Dining Room.—Handsomely panelled in oak of the Tudor period, the dining room is provided with a Richmond "Jacobean" gas fire in an old-fashioned chimney place, and the log fire already referred to. It is illuminated by "Metro" burners on two two-light and two one-light brackets, and a five-light pendant in bronze, all by Ingram & Kemp. The fittings are designed in Tudor period style, to harmonize with the room, with a naturally pleasing effect.

The Bathroom.—In the bathroom is an Arden Hill "King" fire; and the lighting is by Sugg "Elite" and Evered brackets, with "Brentford" burners. Two different types of geyser are exemplified by a Ewart "Supreme" and an Edgar "Instanter;" the former bronzed, and the latter nickel plated. The "Supreme" is a geyser of the circulating type, for supplying hot water to a number of points in the house; while the "Instanter" is suitable for fitting over a bath, and is supplied with an anti-splash outlet and automatic control. In the exhibit the "Supreme" supplies a lavatory basin and one bath, which are also connected with a Potterton unit in the kitchen; and the "Instanter" serves a second bath.

The Kitchen.—The cooker in the kitchen is a Cannon "Challenge" until March 14, when it will be succeeded by a Radiation "New World." Over the cooker is a conveniently arranged hood, to remove hotplate products of combustion and cooking smells. "Metro" and Davis "Crystal" gas irons are provided, with suitable connections and accessories; and there is a Parkinson six-radiant "Edmund" fire. There is a Potterton "Victor" hot water installation, supplying bath, handbasin, and sink in distributed positions, and also operating circulating towel dryers, thus affording a complete example of this system. The lighting is by Whitehouse brackets and Ingram & Kemp brackets, with Evered "Everite" burners. Ironing demonstrations are given at intervals.

The Scullery.—The apparatus in the scullery includes a "Steemkleen" washing machine (to be succeeded later by a "Blighty" washing machine), a Cannon "Corna" wash boiler (to be replaced later by a "Metro" wash boiler), and a Ewart "Brilliant" geyser for the sink. The worry and trouble of wash-days no longer exist in the all-gas home, as the clothes can be rubbed-through in no time with the aid of the portable gas copper. Neither need the elements outside hold any terror for the housewife, who in the ordinary way would at times be compelled to dry the clothes on lines hung in the kitchen or scullery. By means of the "Eco-Dry" cabinet, all this annoyance and inconvenience can be avoided. The clothes are simply suspended on supports contained within the cabinet, and a series of small gas jets provides a warm current of air, which is kept in constant circulation in the enclosed drying

chamber. Clothes may in the same way be thoroughly aired ready for putting away in the cupboard, without the slightest trouble. The lighting in the scullery is by Sugg "Elite" brackets and burners and Whitehouse brackets.

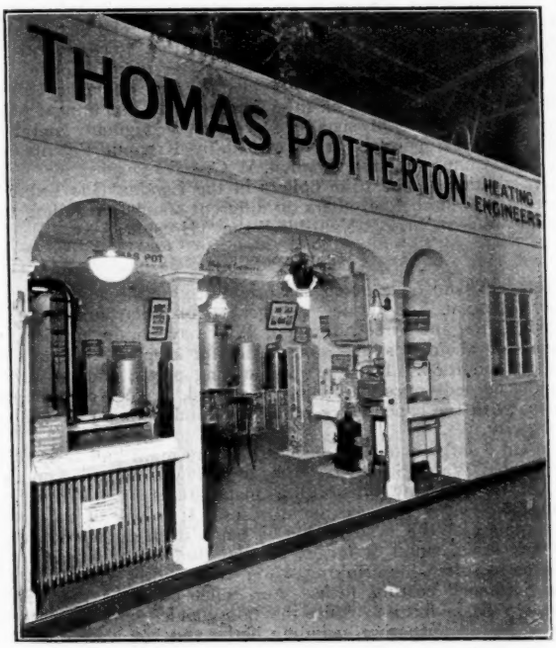
The Study.—The study, decorated in the period of Charles II., has a gas fire thoroughly in keeping with the style—namely, a handsomé "Metro" in old gold finish. There are also highly artistic Ingram & Kemp brackets and pendant.

The Bedroom.—The oxidized silver fittings chosen for the bedroom match well the Adam style decoration. By the side of a Wilsons & Mathiesons "York" fire is a handy curling iron heater by Clark's Syphon Stove Company. There are Best & Lloyd brackets and pendant, to which is appropriately added a "Metro" night-light.

Visitors, in addition to the useful and ornamental things here enumerated (which are set out to give delightful effects that cannot be reproduced in writing), can learn sound common-sense—e.g., "Why gas is a national service. The best gas-works practice passes on for the use of the nation in the form of gas 52 p.ct. of the value in coal; the best electrical practice passes on 12 p.ct. It takes 4 tons of coal used 'the electrical way' to supply the amount of heat obtained from 1 ton of coal used 'the gas-works way;' and 'the electrical' way burns to waste the valuable bye-products which 'the gas-works way' saves."

"Victor" Hot Water Apparatus

There has been adopted on the present occasion by Messrs. Thomas Potterton, of Cavendish Works, Balham, S.W., an entirely new type of stand, forming a complete enclosure, wherein a full range of hot water appliances, including "Victor" gas boilers with various forms of combined equipment to operate with solid fuel for dual purposes, is shown. The



display introduces many important innovations in hot water supply and heating equipment, in keeping with the demand for economy in labour, cleanliness, and general convenience; and it is not out of place to remark that the illumination of the stand has been excellently arranged by the South Metropolitan Gas Company, who have, by means of bowl lights and dainty brackets controlled by switches, provided another good demonstration of the value of gas as an illuminant.

Working installations are exhibited, as examples of high-efficiency apparatus for various purposes. The "Victor-Combination" boiler for solid and gaseous fuel is fitted in conjunction with a Sugg's "Chef" cooker, showing one of the most advantageous forms of equipment for the kitchen of an ordinary villa residence, flat, or cottage. The gas section of the plant is in action supplying hot water with automatic control for draw-off purposes. As an example of low-pressure hot water heating with circulating radiators, a No. 19 "Victor" gas boiler is fitted in the form of a complete installation, indicating the efficiency of this arrangement for small heating requirements, among which may be mentioned private offices, garages, conservatories, flats, and small residences. The No. 19 "Victor" boiler employed is made up with "B" pattern connections, whereby the heating of radiators at the same level is conveniently accomplished; and for the purpose of automatic control, the air thermostat is used. This particular form of control gives most accurate results, and can be set to maintain any desired temperature in the space to be warmed.

Other interesting examples of hot water equipment are to be found in two separate 921 "Victor" complete apparatus with rectangular storage. One of these sets is fitted upon the "push-out" system, supplying hot water to the sink with direct feed from the rising main, to meet the demand for those installations where a roof cistern does not exist. In small tenements or other premises where supplies are required for bath and sink only, this arrangement affords a simple and inexpensive installation. The apparatus is held in readiness cold, to heat-up with quick effect, and so demonstrate the advantage of the "Victor" system for supplying hot water intermittently, which is an essential feature in economy for the use of gas for general domestic purposes.

Another working exhibit which it is hoped will prove of interest is an automatic bottle-washing plant, which affords an example of the use of gas for trade requirements. This installation comprises a No. 18 "D" series "Victor" boiler, with a small open tank connected with flow and return circulation, and having thermostatic control operating upon the bulk, whereby any temperature up to approximately boiling point can be maintained with the utmost precision.

On the inactive side, a general display is made of "H" and "D" series "Victor" boilers and complete apparatus with single and twin boiler units and proportionate storages, providing examples of installations required for varying types of houses where two or more baths may be installed. A useful alternative combination of coke and gas apparatus is a "Domestikatum" boiler applied to a No. 921 "Victor" complete apparatus, which is regarded very favourably for small houses where the warmth of an open fire is desired for the winter months in the kitchen or sitting room. The gas unit and storage tank need not necessarily be alongside. The latter can be placed in an adjoining room behind the chimney breast, by a short extension of the circulation. As an example of larger treatment for houses requiring a series of radiators, there is a combined plant in the form of an Ideal "Britannia" boiler and "Victor" complete apparatus with calorifier; this arrangement providing for hot water to be supplied during the winter months by indirect means, with the alternative action of the direct-heating gas boiler during the summer time, when the larger coke boiler is unsuitable for the small requirements. This type of installation is being adopted very largely on some of the better-class estates, and forms an excellent opportunity for the economical use of gas in conjunction with solid fuel in the form of coke.

Demonstrations of the convenience afforded for cleaning "Victor" gas boilers *in situ* will be given to those interested; and these, having an important bearing upon the question of maintenance, will doubtless be useful. Among other items of "Victor" gas apparatus are included complete sets for soft water districts, in which copper cylinders and rustless castings are employed, maintaining a clean hot water supply where the water has a solvent action on iron or other common metals.

Fires and Fireplaces.

The Bell Range and Foundry Company, of Kingswell Works, Northampton, makers of "Bell" grates, show a new gas fire constructed in faience. It has a cast-iron backplate, on which the back brick, fuel holder, burner, and injector are fixed. The back brick and fuel are of a new type; and there is no visible metal-work whatever about the fire. The fronts are glazed in a large range of beautiful colours, including lustres, and are fitted into tile mantels, either to match the gas fire in colour, or in contrast. They can be made of various sizes to suit different rooms. There is a new "Bell" dog grate which is claimed to burn coke equally as well as coal.

Messrs. Candy & Co., Ltd., of 87, Newman Street, Oxford Street, London, W., display charming tiled surrounds, which have been designed to show the gas fire at its best. In style, colour, and finish they leave nothing to be desired; and no home could be too simple or too elaborate to be a fitting place for them.

Other fireplaces in artistic designs are displayed by the Leeds Fire Clay Company Ltd., of Wortley.

Cookers.

A large space is occupied by the specialities of the New Stimex Gas Stove Company, Ltd., of Stimex House, Balham Hill, London, S.W. On this occasion there is the new "Queen Barless" cooker, the hotplate of which consists of a flat polished surface with holes over the burners for the cooking utensils. The oven burners are, of course, outside the oven in the case of all the many types of cooker on view.

Anti-Waste Appliances, Ltd., of 20, St. Paul's Churchyard, London, E.C., exhibit gas cookers and other apparatus on their particular lines. The cookers, which are constructed mainly of pressed steel, and finished with a hard vitreous enamel, are light in style, and of patterns to suit varying circumstances. Of the burners it is said that they are of a new double type, so constructed as to produce a bunsen flame whether full on or at a minimum. There are radiators, of which it is remarked that

" no flue is required, as they have special burners which effect complete combustion; " and there is the " X = L " domestic boiler for coke or other fuel, which has been specially designed to work in conjunction with a 25 to 35 gallon cylinder. Something by way of a novelty are the " Bolton " divided saucepans and frying pans, with which two entirely different dishes may be cooked at the same time and on the same gas ring. The two halves clip securely together for use when both sections are required; but either section may be used alone. They are of hard-rolled aluminium, and each section is without joints or seams.

Mr. Ernest A. Denyer, of 1, Marylebone Road, London, N.W., shows, in addition to coke boilers, the latest types of Flavel " Leamington " cookers. They have hotplates of special design, and are provided with either single or double type Flavel burners. One principle of the construction of this burner is to make an efficient mixture of gas and air by circulating these elements in a peculiar spiral motion, which produces perfect combustion on ignition. The system of perforated jets has been discarded, and the gas flame issues in a complete circle of solid flame. The Flavel double burner, while very powerful when used at its full capacity, can be employed as a single burner, as the two taps which control the double burner can be operated independently.

The " Smoothtop " gas range is exhibited by the Lawson Manufacturing Company, Ltd., of 31, Gifford Street, Caledonian Road, London, N., as an example of an up-to-date and economical gas cooking range. Among its special features is its polished top, " which is heated by the burners when in use, allowing other vessels to become heated which are not directly over the gas flames."

There are several sizes exhibited by Messrs. Robert Jenkins & Co., Ltd., of Rotherham, of the " Eco " combination, which consists of the linking-up of a coke or anthracite water boiler with a gas cooker. The boiler is heated in the usual way, but instead of the hot gases being allowed to pass out direct through the flue, they are first circulated round the oven of the cooker which is placed by the side of the boiler. This maintains a steady temperature; but should the heat not be sufficient for baking purposes, the gas supply may be turned on until it is. A hinged hotplate is provided, so that, for boiling, either this or the top of the oven heated from the boiler may be used as desired. Coke boilers of various styles are made by the firm—including the " Kalor," with a top chamber arranged for warming plates.

The patent " Gladmayd " parlour cooker, shown by the K.C.B. Foundry Company, Ltd., of 120b, Mount Street, Grosvenor Square, London, W., is a combination grate for heating, cooking, and hot water supply. It is arranged for cooking with coal or gas (or both at once); and it is neat, and even attractive, in appearance. The arrangement of gas rings enables it to be used as a gas cooker in the summer time, or for emergencies. When an exceptional amount of cooking has to be done, both coal and gas can be employed at the same time. The coal fire provides for the ovens and three saucepans; while three additional saucepans can be heated on the gas rings. The gas arrangements are practically invisible.

Water Heaters.

The customary large stand is occupied by Messrs. Ewart & Son, Ltd., of 346-350, Euston Road, London, N.W., who demonstrate their geysers providing instant hot water service for all domestic requirements. There is a full range of " B " pattern " Califonts," from the smallest, with a heating capacity of 1½ gallons per minute, to the largest stock size, heating 16 gallons per minute. " Victor " and " Lightning " geysers are there, as is also the " Boilo " gas heated copper. The " Supreme " geyser, for supplying hot water under pressure, is automatic in action, and will furnish hot water to bath, lavatory, and kitchen sinks, or other taps, as may be desired. A few notes as to the gas installation at Messrs. Ewart's stand—which must be one of the largest gas-consuming exhibits at Olympia—will be of interest. The installation of large geysers, such as the 45B " Califont," or the " O " size " Lightning," each consuming at least 8 c.ft. of gas a minute, in addition to a large number of smaller geysers, entails a maximum consumption of about 44 c.ft. of gas a minute, giving a total consumption of 2640 c.ft. of gas an hour, when all the heaters are in action. This does not include the gas used for lighting; and as eight large burners are installed, a further addition must be made for this. It is very seldom, however, that all the geysers are in use at the same time; and it is found that two 100-light meters are sufficient for the requirements. It has been found better to divide the stand into two parts, with the two largest geysers fixed on different meters, to equalize the load. Two 2-in. main pipes from the meters are used, with suitable branches to the different heaters; but even with these large meters, it is difficult always to obtain maximum results. When it is considered that the total gas consumption of a stand of this type will approach a quarter-of-a-million cubic feet, it will be realized that the cost of gas alone, at a working installation of an adequate range of geysers, is a considerable item in the cost of the stand. Special provision has also to be made for an adequate supply of water and drainage, as unless a good pressure is available the geysers cannot all be working together; and it is, of course, necessary that the water should be taken away as fast as it comes in. At Olympia, however, there is a very good water pressure; and a ¾-in main (the maximum supply allowed) is sufficient to supply all the heaters adequately. During the rush hours it is customary to keep the 45B " Califont " and the " O " size " Lightning " geyser working continuously, in addition to the No. 2 " Lightning," " Elite," " Victor," and " Victor Shower " geysers; the other geysers being used when required for special demonstration. To obtain the full results from a public exhibition of this kind, it is absolutely necessary to have a large flow of steaming hot water, to impress the public with the idea that gas will provide an unlimited supply of really hot water if a sufficiently large geyser is supplied.

New Geysers, Ltd., of 200, City Road, London, E.C., exhibit Barralet's geysers and water heaters of various patterns. The " Two-Way " is intended to be fitted in the scullery, from which point it will supply water to the sink or bath at will. The " Reliafont " may also be fitted in the scullery, or any other convenient position, from which it will provide hot water to taps throughout the building. The latest development is the patented " Access " base, which makes the burner chamber accessible for cleaning *in situ*. The burner can be removed in a few seconds.

The " Clarkhill " automatic heater, marketed by Messrs. Clarkhills, Ltd., of 27, Old Bond Street, London, W., is an automatic, foolproof, instantaneous water heater, specially designed to supply an unlimited quantity of really hot water to as many taps as required all over a building. It can be fixed in any convenient part of the premises. The action of opening any tap automatically lights the " Clarkhill," which heats the water as it flows. When the tap is closed, the gas is cut off, leaving only a small by-pass lighted.

The " Express " boiler is not a geyser, but a novel method of heating or boiling water rapidly. It is claimed by the makers, Express Boilers, Ltd., of 65, Great Portland Street, London, W., that it will give boiling water in 17 seconds.

" Kermak " horizontal water heaters and domestic boilers also furnish boiling water in a few seconds, on a new principle. It is made of steel and welded throughout, and will supply several points. It is owned by Kermak Patents, of 57 & 58, Chancery Lane, London, W.C.

In addition to the coke boilers in the London Gas Exhibit, there are a number of others on different stands—including the " Glow-Worm," the " Nautilus," the " Hotspur," &c.

Miscellaneous.

Readers who have noted the brief account already given in the " Journal " of the new refrigerator of Electrolux, Ltd., of 153-155, Regent Street, London, W., may obtain further information about this household device for keeping foodstuffs in perfect condition. There are no moving parts; and no attention is needed—once the action is started, it goes on continuously, with the expenditure of a very small amount of gas or electricity.

Again a large stand in the centre of the main hall is devoted by United Water Softeners, Ltd., of Aldwych House, London, W.C., to a display of working installations of " Permutit " household water softeners in all sizes. It is one of the great advantages of the system that it lends itself to reproduction on any scale, small or large; so that the person who merely desires to soften his drinking water can do this with a " Midget Softener" costing little. For toilet purposes there is a lavatory basin fixture; while the householder who wants soft water for all purposes, including baths and hot water service, is also catered for. This softener consists of a closed cylinder containing the indestructible water softening substance called " Permutit." There is no mechanism to adjust; and no lime or other chemical is required. A new type is the " DS," which will produce sufficient soft water for a household of three or four people from any water supply of average hardness. It has been specially designed and manufactured to meet the large and growing demand for a small, simple, and low-priced household water softener, which can be easily installed in small houses, bungalows, flats, &c., and will provide all the benefits of a complete soft water supply for drinking, baths, toilet, and hot water service.

An attractive little bungalow illustrates the many uses of " Solignum," both as a wood preservative and as an artistic decorative stain. Special attention is drawn by Messrs. Major & Co., Ltd., of 205, Borough High Street, London, S.E., to the effect of " Solignum " on dry rot; and there are data available showing the small cost at which a house can, by its use, be made immune from this source of deterioration and heavy expense.

Mention has already been made, when noticing the London Gas Exhibit, of the " Eco " drying cabinet. This is shown by the Economic Dryer Company, of West Road, Tottenham, London, N. It can be heated by either gas or electricity; and the principle on which it works is such as to permit heated fresh air to circulate freely among the articles to be dried. The cabinet is made in various sizes to meet large or small requirements.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

ANNUAL MEETING.

Many members attended the fifty-sixth annual meeting of the Institution, which was held on Friday last in the Midland Hotel, Manchester, and was preceded by luncheon. The earlier part of the business proceedings was presided over by Mr. F. H. ROBINSON, of Harrogate. Subsequently the chair was taken by the new President, Mr. C. S. SHAPLEY, Engineer and General Manager of the Leeds Corporation Gas Department, who delivered his address, which took the form of a lantern lecture dealing with various repairs of a more or less unusual character that have recently been carried out at Leeds. This was something of a novelty in the way of presidential addresses, and proved a complete success. Besides giving interesting experiences of his own, Mr. Shapley drew others from various members of the audience, in the course of the discussion which he invited on his address.

NEW ASSOCIATE MEMBER.

The minutes of the previous meeting having been taken as read and confirmed, a new associate member was formally received—Mr. Walter G. Gulland, Manager of the Gas Private Lighting Department, Manchester.

ANNUAL REPORT AND BALANCE-SHEET.

The PRESIDENT next proceeded to move the adoption of the annual report and statement of accounts. He said that, in the latter, members would note, on the expenditure side, that the expenses of general meetings had increased considerably. There were three reasons which accounted for this. There were certain expenses in connection with the visit to the city meter testing station, there were the teas provided for members, and there was some outlay in regard to the extra visit to the Manchester Ship Canal. A new item was "Joint Transactions," £88 3s. Members would recall that it had been agreed to increase the subscription to cover this. On the other side of the sheet appeared the intimation that to pay for 190 copies of "Joint Transactions" £97 7s. 6d. was required out of the balance of £134 3s. 5d. shown to be available—making the actual balance on the year £36 15s. 11d.

The report stated that the membership stood at 198, being a decrease of two as compared with the previous year. The Lancashire and Yorkshire Commercial Sections were carrying out a most important work in a very necessary sphere of labour; and every gas undertaking, whether large or small, must benefit very largely by the information that was conveyed to the members at the monthly meetings.

There were no comments forthcoming from the members on the report and balance-sheet, which were adopted.

REPORTS OF COMMERCIAL SECTIONS.

On the reports of the two Commercial Sections being presented,

Mr. J. H. BREARLEY (Southport) suggested that it would be very helpful if arrangements could be made by which every member of each Section would receive a copy of the reports of both.

Mr. A. E. MOTTRAM (Ossett) remarked that he thought it was agreed last year that the members of one Section should receive the reports of the other.

It was agreed that in future this should be done.

CO-OPERATIVE TAR SCHEME.

Mr. E. H. HUDSON (Normanton) said he would move the adoption of the Yorkshire Section report, in the unfortunate absence of their esteemed Chairman, Mr. Charles Wood, of Bradford, who, he was sorry to tell them, was ill in bed, and so unable to be with them, though he had almost up to the last expressed his intention of being present. The report possessed very few new features, except in respect of the tar scheme. They had already had for some years in Yorkshire a fairly satisfactory system of selling their tar to the distillers; but they had just completed (it was mentioned that at the time of the preparation of the report they had nearly completed it) a new agreement, which was awaiting adoption by the various undertakings to come into force. They would then have joined hands with the Midland, South Western, Bristol, and other districts in selling their tar on a co-operative basis; and they felt quite satisfied that the results would be to the benefit of the producers of tar. They commended the scheme to the serious consideration of the Lancashire Section, who would be in a way, with Durham, outside the pale of the co-operative systems existing in the country. It would be seen from the report that the Yorkshire Section had paid a small tribute to their worthy Chairman. They had in Yorkshire a very estimable man of the name of Charles Wood. ["Hear, hear."] He presided over their deliberations, and was a man in whom every member of the Section had the utmost confidence. They all regretted his absence from the meeting. He had fully intended to be present to move the adoption of this report, and to support Mr. Robinson and his successor, Mr. Shapley. In Yorkshire they regarded Mr. Wood as in no small measure their leader.

The portions of the report to which Mr. Hudson had made reference were in the following terms:

> The Tar Scheme Committee have almost concluded a new agreement with the distillers under which it is confidently expected better prices will be realized.
>
> At the January meeting, the President received a surprise in the form of a gold cigarette case presented to him by the members in honour of his birthday, which, by a coincidence, fell on the day of the meeting. The inscription was:
>
> > "Presented to Charles Wood, Esq., O.B.E., F.C.S., President Yorkshire Gas Engineers, by the members as a mark of esteem on his birthday, Jan. 6, 1926."
>
> The Committee offers its grateful thanks to Mr. Charles Wood for his distinguished services as President and to the Bradford Gas Committee, through the good offices of Mr. Wood, for the use of the Darley Street showrooms for the meetings.

Mr. W. J. SMITH (Bolton), in the absence of Mr. S. Meunier, the Chairman, formally moved the adoption of the report of the Lancashire Section. He said that the Lancashire Section, equally with the Yorkshire Section, regretted the illness of Mr. Wood. They all esteemed him very highly—not only as a Yorkshireman, but as an English gas engineer. ["Hear, hear."]

Mr. W. M. CARR (Stretford), in seconding, remarked that if in Lancashire they had not yet adopted a co-operative tar scheme, it was because they had not yet been able to get the terms which they thought they ought to obtain. The matter was, however, still under the close consideration of the Section. They realized, just as much as did their friends in Yorkshire and elsewhere, that it was the policy to adopt. It was their hope that they would soon arrive at the basis of a scheme which they would feel able to adopt.

Both reports were then adopted.

MR. CHARLES WOOD'S INDISPOSITION.

On the proposition of the PRESIDENT, it was agreed that a letter should be sent to Mr. Charles Wood, of Bradford, expressing the earnest wish of the members of the Institution that he might be speedily restored to health.

The HON. SECRETARY (Mr. William Rogerson, of Middleton) notified the receipt of apologies for absence from the Presidents of kindred Associations, and from some of their own members.

BENEVOLENT FUND OF THE INSTITUTION.

Moved by Mr. G. S. FRITH (Runcorn), and seconded by Mr. R. H. GINMAN (Leek), it was agreed that the sum of £10 10s. be granted to the Benevolent Fund of the Institution of Gas Engineers.

INSTITUTION COUNCIL REPRESENTATIVE.

On the motion of Mr. FRITH, seconded by the PRESIDENT, Mr. Shapley was appointed the representative of the Manchester District Institution on the Council of the Institution of Gas Engineers for 1926-27.

REPRESENTATIVES ON JUNIOR ASSOCIATION COUNCILS.

Mr. H. E. BLOOR (York) moved, and it was agreed, that Messrs. W. Buckley (Manchester) and W. B. McLusky (Halifax) be appointed the representatives of the Institution on the Councils of the Manchester and Yorkshire Junior Associations respectively.

"B.C.G.A." DISTRICT CONFERENCES.

The PRESIDENT said Mr. Mason was present, and he would ask him if he would address the meeting at this point.

Mr. W. M. MASON (Manager of the British Commercial Gas Association) remarked that he wished merely to draw their attention to the fact that two District Conferences had been arranged to be held shortly—one on the kind invitation of the Buxton Gas Committee, through the influence of Mr. F. G. Shaw, and the second on the kind invitation of the Wallasey Gas Committee, through the good offices of Mr. J. H. Crowther. The Manchester District was such a large and important area that it really needed two conferences to cover it; and he appealed for the fullest co-operation of the members of that Institution. The programmes would be well worthy of the attendance at the conferences of every member and of every chairman of a gas undertaking in the district. The dates, of which he asked them to make careful note, were: Buxton, May 14; and Wallasey (which included Cheshire and North Wales), May 18.

INDUCTION OF THE NEW PRESIDENT.

The PRESIDENT said his next duty was the principal one of the day, and his last as President of the Institution—namely, to induct his successor in the chair. In Mr. Shapley, he felt sure the Institution would have a worthy President—a man who was full of life and energy, and who had the interests of the Institution very much at heart. As a former resident in Sheffield, he was an old member of the Institution, and

more recently at Leeds he had been a very active member. He knew that he could safely assure Mr. Shapley of the fullest support of everyone connected with the Institution. He wished him a pleasant year of office, and every success in all his endeavours. ["Hear, hear."]

Thanks to the Past-President.

Mr. C. S. Shapley (Leeds) then took the chair, and was cordially greeted by the members. He said that the first thing he was privileged to do was to propose a very hearty vote of thanks to Mr. Robinson for the able manner in which he had presided over their deliberations during the past year. They all carried back their minds to the pleasant day they spent at Harrogate, and to the generous way in which the Directors of the Harrogate Gas Company entertained them. They also remembered his Presidential Address. Mr. Robinson had had a wonderful year of office, and had carried out the duties with every satisfaction to them all. For this they offered him their warmest thanks. [Applause.]

Mr. Robinson expressed his gratitude for the vote, and said his year of office had been most enjoyable—particularly because this happened to be his native place, for he was born in Salford and educated in Manchester. He hoped the members would extend to Mr. Shapley the same hearty support that they had accorded him (Mr. Robinson).

Mr. C. S. Shapley then proceeded to deliver his Presidential Address, in the preparation of which, he said, he had been bold enough to depart from the usual set style, and to arrange the matter in the form of a lantern lecture. This was why the members had not print copies in their hands. He had taken for his subjects two or three repairs of an exceptional nature which had been carried out in Leeds in the course of the last two or three years, and had a series of lantern slides prepared from photographs of the work. Since then, however, he had had interviews with other engineers, and exactly what

THE PRESIDENT,
Mr. C. S. Shapley, of Leeds.

he expected would happen had happened—he had learned that they had carried out much more interesting repairs than he himself had. He had expressed a wish that the address should be followed by a discussion, if time permitted; and he hoped that what he had to tell them would draw from others an account of the means by which they had overcome even greater difficulties. It was with this in view that he had prepared his address.

PRESIDENTIAL ADDRESS.

Let me immediately proceed to thank all the members for the honour they have done me in electing me to the responsible position of President of this important Institution; and at the same time let me say that I am fully aware, having regard to the records of Past-Presidents, of the high standard set me for my year of office. I cannot claim the same distinction as my predecessor of two previous Presidents having been my Chiefs, but I can claim one in the person of Mr. J. W. Morrison. I therefore promise you that it will be my constant endeavour to uphold the traditions of the Institution, and to serve you, if possible, as ably as my predecessors. I recollect Mr. Robinson, at the beginning of his Presidential Address, saying that "Presidents, in their addresses, had practically exhausted the subjects available, and left the new President with scarcely a plant in the garden." I find myself in the same position, and therefore thought I would, with the aid of a few lantern slides, explain some exceptional repairs carried out in the course of the last two or three years. To some members there may be nothing novel about these; but, on the other hand, I am hoping that in the majority they will create interest, and, if time permits, I propose to throw the meeting open, in order that members may have an opportunity of stating any exceptional repairs they have carried out.

There must be many works in the kingdom similarly placed, with regard to gasholders and tar wells, to Leeds, where the tops of the gasholder tanks are on the ground level, and are unprotected by any walls, making it thoroughly easy for dirt and other matter to find its way to the bottom of the tank; while many gas-works have holders where corrosion has ravaged the steel work.

Due to the past methods of carbonization, I found that all the bottoms of the tar wells contained anything up to 3 ft. of very stiff pitchy material, which in some cases practically amounted to free carbon. I have had all these thoroughly cleaned-out; and I propose further on to deal with the one which gave us the most difficulty, inasmuch as we suspected a leakage from this well.

Dewsbury Road Gasholder.

This holder is situated in close proximity to a chemical works on the western side, and as a result intensive corrosion had taken place. The condition of the sheets was such on this side of the holder that it was deemed inadvisable further to weaken the sheeting by continuous patching; and it was therefore decided to re-sheet the bad plates. This holder was our largest; there being but one other on this station, and that had only half-a-million c.ft. capacity. Dewsbury Road is one of our main distributing stations, supplying a heavy industrial district with a peak load varying from 200,000 to 350,000 c.ft. per hour. It will be readily appreciated that, with this holder out of commission, there was not much storage margin to enable us to maintain the normal pressures. This, however, was achieved during the whole time the holder was under repair.

Our total storage capacity is equal to one day's winter output, and consequently very little margin is left in summer to do the necessary repairs and painting. Therefore difficulty presented itself as to the length of time the holder would be able to be out of commission, if the repairs were to be carried out in the ordinary way. Further, we were also anxious to do some repairs to another holder at our Kirkstall Station during the same period. It was decided to avoid, if possible, the cost of emptying the holder of gas and purging with air. We therefore arranged to use the top lift as a carrier; the middle lift being raised and suspended by means of 130 long screw couplings spaced evenly around the top curb (see fig. 1). A point of

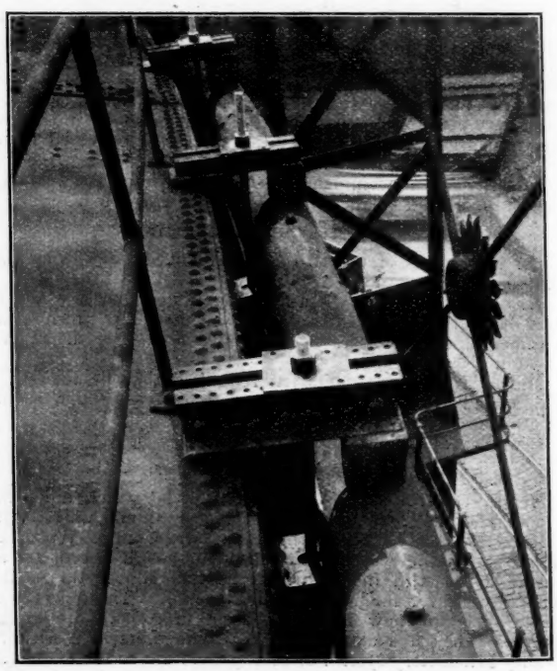


Fig. 1.—Repairing Gasholder; Details of Coupling.

Girders, packing blocks, dip hooks, chocker wood to keep hooks in position. Hooks pass under the dip of the second lift and the two lifts are fastened and made firm. (Meadow Lane, June 5, 1925.)

interest is the weight of the suspended middle lift, which was 130 tons.

Arrangements were made early in the New Year to take advantage of the summer time near the approach of the longest day; and a start was made on the morning of June 4. The holder was grounded, and the 130 screws placed in position; gas being turned into the holder at 4.30 p.m. the same day.

The position of the holder was altered from time to time to suit the convenience of the repairers. During the time occupied by the repairs, a close watch was kept of stocks and pressures at our out-stations. The attendants had special instructions to meet any requirements of the Dewsbury Road Station; and this entailed the closest attention to duty.

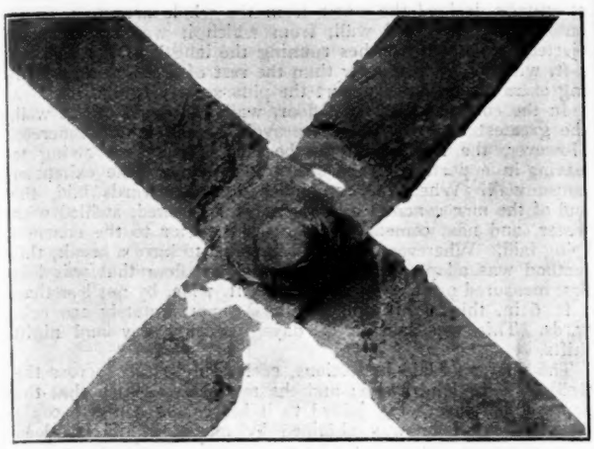


Fig. 2.—Small Holder; Renewal of Top and Middle Girders.

Near view of a typical example of the corrosion which has taken place behind the decorative stars. The photograph is of a middle girder. (Kirkstall Outstation, Aug. 29, 1922.)

In all, 102 sheets were replaced, each measuring 8 ft. by 3 ft. 6 in. The riveting was reversed; the cup heads being on the inside. This, to my mind, is a distinct advantage, as it facilitates the keeping-down of corrosion. The sheets should also overlap on the inside, as this eliminates any trouble from oils or solvent percolating through the jointing tape after collecting on the inside of the holder, and running down the outside of the sheeting.

If the edge of the sheet is hammered-down on the outside when riveting is done, the ledge is too small to hold moisture, and will soon become filled up with paint. You will, I am sure, appreciate that a holder shell constructed in this way would be much easier to paint and keep free from corrosion. The public suffered no inconvenience from these repairs; and in exactly fourteen days from the start the holder was again placed in commission—a tribute to the contractors, Messrs. Clayton, Son, & Co., Ltd.

Kirkstall Holder.

A further interesting repair was carried out to the guide framework of a 1¼ million c.ft. holder at our Kirkstall Road Station. This is one of the oldest gasholders in Leeds; and the last time the tank was emptied was in 1882, when Messrs. Clayton added a third lift.

The idea of ornamentation by means of cast-iron rosettes seems to have been uppermost in the minds of the designers of the period, with the result that much of the work that was really a vital part of the structure was inaccessible for painting or repairs; and it will be noticed in figs. 2 and 3 how the metal of the bracings on the girders had been eaten away behind the ornamental rosettes (without which the girders of those days were considered incomplete). Another point I would draw your attention to is the method of riveting-up the bracings, and the general construction of the lattice girders of this holder.

You will notice that the ends of the bracings are hidden between the top and bottom angles of the old girders. This, no doubt, from an artistic point of view, may be very nice; but due to the fact that the flanges of the girders were finished-off with stiffening plates, a channel was left in which water could lodge on the lower flange. This, after a time, corroded the inside of the angles, and weakened them to such an extent that the whole girder began to buckle. The new girders were constructed in a simple manner, with due regard to the strain they had to meet; the top and bottom flanges being formed of T irons, and the cross bracings riveted on the outside. They are thus accessible to the painter, and free from any danger of water lodging. The crown of the holder was used as a platform for the lifting tackle; runways being laid on the curb sheets for the derrick to be easily moved from point to point as each girder was taken out and replaced by a new one.

The actual falling of a finial and apron piece—happily with no serious consequences—caused us to investigate the condition of the fixings; and we also found that the finials on the standards had the same detrimental effect on the guide framing. They were composed of heavy castings with aprons covering the joints of the girders, the supporting bolts of which had corroded away; and in many cases the shanks had parted from the heads altogether. Behind some of the cast-iron aprons many of the lugs were found to be cracked and broken off. Needless to say, the finials and aprons were condemned and removed. Upon a close examination of the girders being made, it was found necessary to replace the top and second rows of girders by fixing new ones. With the removal of the superfluous ornamentation from this holder, the outline of the structure, to my mind, is more in keeping with the original purpose for which it was intended, having lost the top-heavy appearance which the finials and aprons gave it; and at the same time it is a sound engineering proposition.

Further repairs to the shell of this holder at Kirkstall were undertaken in 1925, owing to the lifts being out of level through some obstruction on the rest blocks, which it was found impossible to move without emptying the tank. Fig. 4 shows the accumulation of matter which was the cause of this. As the floor of the tank is 14 ft. below the level of the River Aire, which runs past the site, we were somewhat dubious as to what effect the upward pressure of the water might have on the tank bottom. There was a deep sump in close proximity to the holder; and a pulsometer was fixed in this, so as to keep the level of the water in the sump at all times below the level of the water in the gasholder tank. We were able to syphon-off water for about 12 ft. down, which incidentally did away with the cost of steam and attendance, after which the pipes were coupled to a pulsometer, and the whole of the water was discharged into the river.

When an examination of the interior was made it was found (see fig. 5) that quite a collection of articles of all sorts and

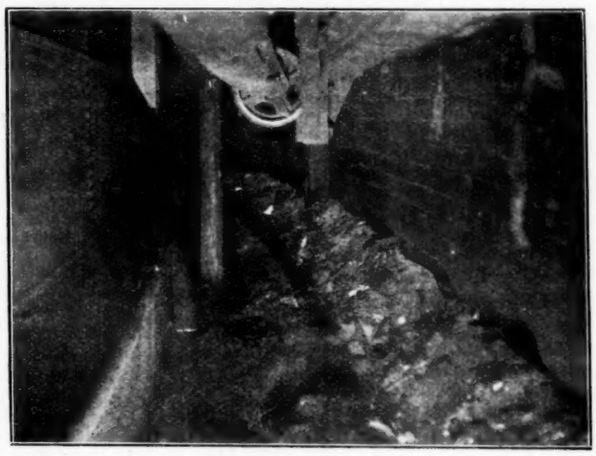


Fig. 4.—Repairing Holder.

Photograph taken showing the amount of accumulated silt, paint chippings, &c., also track of outer lift which was keeping outer lift 10 in. above the rest blocks. The prop which is seen packing the middle lift is resting on the original level of the rest blocks. To the left is seen the inner lift of the holder and cup sheet, which is at rest on the rest blocks, thus giving an idea of the amount of dirt which had accumulated. (Kirkstall Outstation, Sept. 19, 1925.)

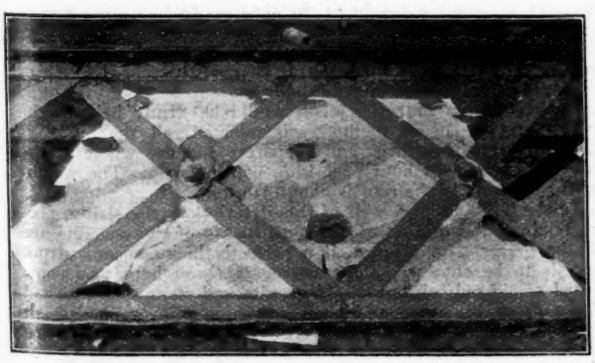


Fig. 3.—Small Holder; Renewal of Top and Middle Girders.

Corrosion taking place behind the stars on lattice work. The photograph shows a top girder. (Kirkstall Outstation, Aug. 29, 1922.)

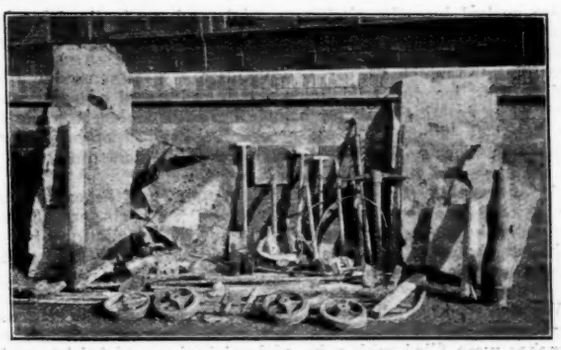


Fig. 5.—A Miscellany of Articles Recovered from between the tank wall and the shell of a Holder.

sizes had somehow found a resting place down the space between the tank wall and the shell of the holder, throwing the outer lift 10 in. out of level; and this, with the accumulation of dirt washed-in by rain water during the last 42 years, was what we had to contend with. A 9-in. brick wall 12 in. high has since been built round the tank top between the columns, to obviate a recurrence of this trouble in the future; and it is surprising what an amount of dirt has blown up against this wall in a very short time—thus proving its absolute necessity.

Springs of water made their appearance in the puddle bottom as the tank was nearly empty; and these we had to drain-off to a sump, and continually keep the pulsometer working while cleaning operations were going on. Approximately 170,000 gallons were pumped out each day, to enable the men to remove the rubbish. To give easier access to the material, the outer and middle lifts were raised by means of long screws to the height of 4½ ft.; and the carriages were utilized as packings. Six manholes were also cut in the inner lift, to facilitate the quick loading-up of the barrows with the rubbish which had accumulated on the rest blocks; the barrows being then wheeled along scaffold boards laid on the floor of the tank, to the platform under the steam winch, where they were raised and received by the men above, and wheeled away to the sludge dump. This part of the proceedings was most unpleasant, owing to the stirring-up of putrid matter and the accumulation of hydrocarbons deposited on the clay; consequently the men had to work in relays.

During the time the work was proceeding in the holder bottom, the shell was levelled, and all the carriages and guides were adjusted; defective bolts and spindles being renewed where necessary. Many rivet heads in the cups and dips were badly corroded; these were renewed, and the beading straightened where damaged. The two lifts were then lowered on to the rest blocks, and the manhole covers put on.

Our next concern was the spring water entering the tank; and it was found necessary to insert three 6-in. diameter relief valves of the mushroom type. These were made of steel tube 1 ft. 6 in. long, welded on to a ¾ in. thick base plate 2 ft. 6 in. in diameter, and let into the tank bottom with the valve seats 2 in. above the finished level of the clay. As a further precaution, large mattresses of fine cow hair and short goat hair, held down by wire meshing, were laid on the clay adjoining these springs; and finally the pulsometer suction pipe was raised, and a cart load of good puddle clay dumped into the temporary sump hole.

Tar Well.

The old tar well had been in use between forty and fifty years; and nothing was known of its construction, except that it was built of bricks, and was puddled all round.

Knowing there was a considerable deposit in this well, and having reason to believe there was a leakage, we decided to remove this deposit, and at the same time to take the opportunity of examining the tank. Due to our ignorance of the construction of the tank, we were rather at a loss to know how to commence operations. With a view to safety, we began by relieving the tank of some of its top weight, which, as we proceeded to excavate, turned out to be considerable.

One day the men had just left work when, without any warning, the top collapsed. Immediate examination of the revealed tank showed that the whole of the jointing material of the brick work had perished; and, in addition, the three rings forming the arches were composed entirely of square bricks. That the arches had stood the strain for so many years under these conditions was somewhat of a surprise, as the heavy traffic in and out of the works had to pass over the site. We had often discussed the best method of cleaning-out the tank, without coming to a definite conclusion. The collapse, however, not only decided this for us, but showed how necessary it was. Some of the deposits were nearly 3 ft. deep, and in no place were they less than 12 in.

We carefully removed the whole of the top, and were then confronted with the problem of getting the deposit out. This was not at all an easy matter, and several different methods were tried before we found a successful one. This consisted of tipping dry boiler ashes all over the well. The dust and ashes were sucked into the pitchy material, and gradually dried it, making it possible to remove it by pick and shovel. The bottom of the old well was built of bricks three courses thick, the joints of which were run with pitch. After removing the old bottom, we dug trial holes and found a bed of sand and gravel, 24 in. thick, 12 in. below the original level; while a further 4 ft. down we came across a thick bed of hard blue clay, on which we decided to concrete. This incidentally gave us the increased storage capacity we desired.

An interesting fact brought to light was that the exhauster house wall had been built directly on to the springers of the tar well; the wall of the well serving for the foundation of the exhauster house. A portion of old foundation was left in as a support to this wall, and was not removed until we were ready to replace it at once with concrete.

We experienced difficulty with water at this depth, so trenches were cut below the bottom of the new well. The trenches were filled with 9 in. of hard broken red bricks, and finished with a course of red bricks laid flat. These trenches effectually drained the water from the whole area to a sump outside the new well wall, from which it was continuously ejected. The two trenches running the length of the well are 4 ft. wide and 6 in. deeper than the rest of the bottom, affording extra strength to support the pillars carrying the roof.

In the construction of the floor, walls, and roof of the well, the greatest care was taken to avoid breaks in the concrete. However, the floor could not be laid in one bed, owing to leaving-in a portion of the old well to support the exhauster house wall. When the remainder was afterwards laid, the end of the new concrete bed was carefully picked, swilled with water, and neat cement thrown on just prior to the concrete being laid. Wherever we were compelled to have a break, this method was adopted. The portion of the floor that was laid first measured 95 ft. 6 in. long, by 33 ft. wide, by not less than 1 ft. 6 in. thick (2 ft. under pillars)—approximately 190 cub. yards. This was laid in 6½ days, working day and night shifts.

The floor was laid in sections, each being 11 ft. (across the well) by 8 ft. lengthwise; and the method was such that the next section was being joined to it before the concrete could set. A level floor was obtained by means of 18 in. deep shutters across the well, set by spirit level. Under the pillars carrying the roof, expanded metal was laid, 6 ft. in width and the full length of the well. In the middle of the floor a sump 3 ft. square by 1 ft. 6 in. deep, enables us to empty the new well completely.

Immediately after this portion of the floor was laid, the bases of the pillars were set out and constructed. Three 1-in. bars, set triangularly, were driven 10 in. into the concrete floor (before it had set), and left projecting about 12 in. The boxes were set in position, and the concrete filled-in 1 ft. 6 in. high. These bases were really set like this to enable us to shore the exhauster house wall from them; but this was found afterwards not to be necessary, otherwise they would have been built completely.

The framework of the pillars was made from old 4 in. by 4 in. steel angles braced by flats. They were fixed vertically embracing the bases of the pillars, and were lined with 9 in. by 1 in. boards, which were consecutively filled till the top was reached. After allowing sufficient time for the concrete to set, the frames were disconnected, taken down (in halves), and reassembled to form the next pillars. Buckstays from one of our old inclined retort houses were finally used in the construction of the roof of the well, but were first fixed to support the shuttering for the walls. Girders were erected opposite each pillar at the exact distances, and fastened together at the top by means of old 6 in. by 6 in. angles, and secured to the pillars by means of 5 in. by 2 in. timbers. These timbers also form the supports for the platform round the well.

The removing of the old earth, the finishing of the floor, and the construction of the new concrete abutment were carried out most expeditiously, occupying 3½ days, working two shifts per 24 hours. During the carrying out of this portion of the work, some anxiety was experienced as to what might happen to the exhauster house walls; but fortunately we were able to complete the work without mishap of any kind.

After all the girders had been erected round the wall, the portion of the concrete bottom forming the foundation for the walls was well picked and scrubbed. The first row of shutters was then fixed in position all round, and the construction commenced. Immediately preceding the laying of the concrete, the bottom was again thoroughly swilled with water from a nozzle and a good layer of neat cement sprinkled on, making an absolutely tight joint between the floor and the walls. The method adopted in building was that of laying only a certain thickness of concrete, which ensured us going at least all round the well to the starting-point again before the concrete could set. This resulted in a perfectly homogeneous and solid wall. To enable us to do this, wood chutes were fixed at 9 ft. intervals all round the well; the receiving hoppers of the chutes being made large enough to take the contents tipped from the barrows. The portion forming the chute was made in three lengths, to suit the height of the shutters (2 ft. 9 in.); and as each shutter was filled, a length of chute was removed.

The roof of the wall was made of concrete supported by the old 16 in. by 6 in. H buckstays. They were secured by three 1-in. diameter distance pieces equally spaced. Cleats were bolted on the ends, so that the joists would be firmly held in the concrete. The usual method was adopted, all the ten bays being fitted with centres and supports; and the whole of the roof was laid in 94 hours, working continuously. The weight of the concrete in the roof is about 310 tons.

In the building of a well of this description, the sizing, proportioning, and mixing of the constituents of the concrete are of the greatest importance, if a perfectly homogeneous structure is to be obtained. The aggregate throughout was composed of old red bricks and old granite and stone sets, crushed down to 1¼ in. cube, and passed over a ¼ in. square mesh screen. All the screenings were rejected. Barrows were specially made of 2 c.ft. capacity for measuring the aggregate. They were formed with a sloping bottom and swinging door, so that they emptied themselves, which dispensed with tipping. The bodies of the barrows were placed well forward over the

wheels, making it much easier for them to be wheeled. Other barrows were made similarly, but of a capacity to hold both sand and cement; the latter being previously measured.

The use of these special barrows did away with all guess-work, and correct proportioning of the materials was ensured. One barrow of aggregate (levelled-off) was emptied into the hopper of the mixer first, the sand and cement next, and then another barrow of aggregate. These were tipped into the revolving drum, 5½ gallons of water added, and given a period of 1 min. 20 sec. to mix before being discharged into the barrows to be wheeled to the site. The mixer was of the cylindrical drum type, with a nominal capacity of ¼ cub. yard, and making 18 revolutions per minute.

The inside dimensions of the well are as follows:

Length	90 ft. 3 in.
Width (at bottom of abutment)	30 ,, 9 ,,
Width (above abutment)	33 ,, 7 ,,
Height to overflows	10 ,,
Height to underside of joists	11 ,,
Capacity to overflow	181,500 gals.
Capacity at 11 ft. deep	200,056 ,,

Discussion.

Mr. F. H. ROBINSON (Harrogate) said he assumed from Mr. Shapley's remarks that he would like members to give an account of unusual repairs or difficulties; but it should be clearly understood that it would be *infra dig.* to discuss the President's Address. As a lead-off, he would relate the story of one little thing he himself had had to do during the war years. Those who visited Harrogate would recall that there was a light railway there to handle coal, tar, and liquor. It was 2 ft. gauge.

A HOME-MADE LOCOMOTIVE.

Right in the middle of the war, the fire-box of the locomotive gave out. The problem with which they were faced was how to get coal into the gas-works; and as no other method than the light railway was practicable, they got hold of a "Sentinel" boiler with under-type engine, and in their own shops made up a locomotive which hauled 70 tons a day on a gradient of 1 in 16. Coal which was delivered while the locomotive was away was brought by road; but the bulk of the work was done by this home-made locomotive.

REINFORCED CONCRETE TANKS AND VIBRATION.

Mr. H. CHAMBERLAIN (Sheffield) remarked that more years ago than he cared to remember, in the early days of reinforced concrete, he had a problem in regard to converting an old gasholder tank into a tar and liquor well, and throwing it into the main roadway of the works. One point about the work that greatly concerned him was the capability of reinforced concrete to withstand sudden and continuous shocks. It was the intention to put 6-in. sets on the top; and when everything was ready there happened to be a strike at one of the ports, which prevented the delivery of these sets. The contractors offered Aberdeen granite 5-in. sets; and this was the best that could be done. But it was necessary to make up this last inch, and that was the difficulty. The very morning of the day on which a decision had to be arrived at, he read in the local Press that some reinforced concrete sleepers had failed owing to being unable to withstand a sudden shock. The job was at a gas-works on the East Coast, where there happened to be a lot of silt, almost clay; and it struck him that they could make-up this last inch of space by using this silt, which would probably absorb the shock. This was done, and the effect was rather remarkable. He was able to obtain the services of a very heavy traction engine, and made up a load of about 20 tons altogether. He gave instructions that this should be run over the top of the tank when he made a signal; and then he proceeded to the bottom of the tank. After giving the signal for the engine to run over the top, he waited five minutes, and then came up and asked why it had not started. The reply was that it had been over twice. On the top of the tank one could feel the vibration; but the silt had prevented any trace of it being transmitted to the reinforced concrete. This, he believed, was the first instance of a reinforced concrete tank being made in a main roadway of a works. Had Mr. Shapley considered the eventual effect of constant vibration, seeing that his tar and liquor tank was in the main roadway?

REPAIRING GASHOLDER SHEETS BY WELDING.

There was another point with regard to the gasholder repairs of which Mr. Shapley had spoken. He had been much interested in certain statements he had seen in the Technical Press, and would like to know whether Mr. Shapley or any member present had had any thought of repairing gasholder sheets by means of welding thin sheet steel on top of the faulty sheets. He happened to be visiting a works on the East Coast during last summer, and saw that the crown sheets of a gasholder had been repaired by means of the welding of thin metal just over the faulty places; and he formed the idea—which he might have an opportunity of carrying into effect this year—of trying the same method on the side sheets. This could be done with the holder in action; and it seemed to him to be a very simple, effective, and inexpensive method of repairing holed gasholder sheets. There might be some doubt with regard to the safety of the process; but from what he had seen of this case on the East Coast, he thought there was nothing to fear. He had had the opportunity of discussing the matter with the contractors who did the work; and they said they had made laboratory experiments on small tanks filled with gas under pressure. They had punctured the tanks, and then sealed up the punctures with the molten metal.

Mr. A. L. JENNINGS (Spenborough) said he had been rather interested in Mr. Chamberlain's remarks, because he himself had constructed a 40-ft. diameter reinforced concrete tank for tar and liquor. Though a great believer in reinforced concrete work, he would not construct another underground tank in this manner. He drew up a specification by which the contractor, on completion, had to fill the tank with water, and it had to remain tight seven days. He believed the contractor had to fill it five times before it was entirely tight. As to welding sheets on holders, he did not think the question of strength entered into the matter, because the cup of the holder was not suspended from the side sheets. One could take all the side sheets off, and the cup would still be suspended. Therefore it seemed that the welding of a plate on another plate was simply a matter of a plaster. Whether it would be properly welded was another question. Regarding concrete work, sometimes people specified so much aggregate to one bag of cement; but they should say cement in 10 bags to the ton, and not 12 bags, which one occasionally met. The address was a very valuable one.

Mr. CHAMBERLAIN pointed out that, when referring to the safety of the welding operation, he was not alluding to the structure, but to the possibility of carrying out the work without fear of ignition of leaking gas.

EMERGENCIES.

Mr. J. P. MITCHELL (Blackburn) also expressed indebtedness to Mr. Shapley for his address, and went on to refer to an early experience of his own in connection with a gasholder at Port Glasgow. They were not in the happy position of Mr. Shapley, for they had only one holder; and the best part of one man's time, from year's end to year's end, was taken up in watching the sheeting, both on the top and on the sides. Holder tightness had a great deal to do with the loss by leakage. When he took over at Port Glasgow there was 16½ p.ct. of unaccounted-for gas; but with the careful attention given to the holder, this was reduced in four years to 8 p.ct. The number of patches on that holder was simply colossal. Mr. Shapley's reference to the tar well had reminded him of an exciting experience which he himself had the day previous to his marriage. He was called to the works because the men there could not get the gas away from the retort bench; and after having gone through the plant, he examined the overflow into the tar well. It was under the coke yard, and to his surprise it had been plugged up with coke. After taking the coke from the overflow, the tar flowed into the well, and relieved the back-pressure on the mains. The day following his return from a very short honeymoon, he was met by his stokers, and quite a crowd of people out in the street, and informed that the retort house roof had fallen in. It had been the practice at that time to quench the coke in a corner of the retort house; and the smoke and fumes arising from this had eaten away the principals, and the weight of the slates had caused a collapse. Later he went away for a week-end, and on his return was met at the railway station by a newspaper reporter, who asked him for a few particulars as to the fire at the gas-works. On reaching the works, he discovered that the grips for the purifier covers had come asunder, and the gas had escaped and become ignited by a lamp in the yard, thereby setting the office in flames.

CONCRETE WORK ON MADE GROUND.

Mr. F. E. M. TOOLEY (Liverpool) said that probably a good many members had had trouble in the same respect as had lately occurred at Liverpool—*i.e.*, in the excavation of made ground. In connection with purifiers, they had been excavating on the site of a former brick works, the owners of which had removed all the ground and filled-in with rubbish to a depth of 12 ft.; and trouble from the sides falling-in arose when they were at work on the piers. Therefore they adopted the plan of going down a certain depth, and putting shutters in—not from the bottom, but from the top—and concreting round with breeze concrete. When this was dry, another depth was excavated, and the shutters were put in again, and so on. At the end of this work they had a nice clean hole, and were able to fill the concrete in without any further trouble.

TANK EXPERIENCES.

Mr. R. H. GINMAN (Leek), in winding-up the discussion, and proposing a hearty vote of thanks to Mr. Shapley for his very interesting address, said they were grateful to him for giving them so many hints for guidance and points for study. It had been a delightfully interesting afternoon. Mr. Shapley had broken away from the traditions of the Presidential Address; and he (the speaker) was wondering what in twelve months' time he would be able to hit upon for his own address. Proceeding, Mr. Ginman referred to a very unusual repair job he met with 23 years ago at the Tyldesley Gas-Works. The Council had decided to overhaul an old gasholder and place a steel tank inside the existing brick and puddle tank, on a concrete bed. The contractors were doing this work at the time of his appointment. Arrangements were made so that the tank was bodily lowered on to its bed of concrete; while at the same time the holder was suspended from the columns. Subsequently the holder was lowered into position, and the cavity between shell and tank filled-in with cement. The duckfoot bend at the bottom of the inlet pipe had been sealed with water for nine months to 6 ft. head, and had stood permanently at this level. At the close of the tank fixing operations, they pumped the water out of the inlet pipe, only to find next day the water at the same level. Careful examination showed the duckfoot bend to be cracked, and that water was running in through the crack, and being maintained at the level stated, from the water-bearing strata surrounding the steel tank. The bend had to be cut-out and renewed—necessitating the cutting of the floor plates of the new steel tank—and secured to the tank floor with angle clips.

Mr. W. J. SMITH (Bolton) said he had much pleasure in seconding the vote of thanks to the President for his contribution to the proceedings of the Institution. They had expected something quite good from Mr. Shapley as President; and they had had it. No doubt presidents had difficulty in finding new ground to traverse in their addresses; but Mr. Shapley had been very happy in his solution. They looked forward to a successful year with him in the chair. He (the speaker) had been forced into adopting a concrete tank, and felt anxious when somebody suggested that liquor was a very bad thing to put into concrete. But his mind was eased when he took

out an old tank which had 6in. of concrete, and found the concrete was in excellent condition and the brickwork unaffected.

The President's Reply.

The President thanked the members for the kind way in which they had received his address, and said it had been a little difficult for him to get hold of suitable subject-matter, because within the past few months he had delivered another Presidential Address, besides reading a paper. Had it not been for the help of his staff, he could not have given them what he had that day. All the photographs had been taken by his Chief Chemist; and Mr. Webb and Mr. Cooper had assisted him greatly. At Leeds they made a practice of keeping "progress photographs," and found them very useful. Mr. Mitchell had said that he had been in charge of a works where there was only one holder. Well, he (the President) was at Southend at the time of the war, when the town was troubled with the attentions of unwelcome visitors; and on the morning following a heavy raid his attention was called to the fact that it was impossible to get much gas through the inlet of the only holder they could work. What he did was to get a 1½-pint lubricator, fill it with paraffin, and steam the inlet; and this did away with all trouble. He recalled a case in which the man responsible for pumping it had been "dipping" a syphon pipe for a long time, and ultimately trouble arose from water in this pipe. It was then found that with the constant knocking a hole had been made in the bottom of the main, and there was a spring underneath. Thus was this trouble solved. He thanked those who had joined in the discussion and related their difficulties and experiences, for it was necessary that they should be of service one to another. From such meetings they could all derive benefit; and he hoped they would be able to persuade some of the younger members to come along and give papers, and that these papers would be subjected only to constructive criticism. Many persons who were in possession of excellent material were a little diffident about coming forward with it, because they feared being "hauled over the coals."

Services of the Officers.

The President expressed his pleasure at seeing their old friends Mr. Banbury Ball and Mr. Haddock with them. Both had rendered distinguished service to the Institution.

On the proposition of Mr. Brearley, seconded by Mr. W. Whatmough (Heywood), a hearty vote of thanks was passed to the Committee and officers (including the Hon. Secretary, Hon. Treasurer, and Auditors) for their services during the past year.

Leeds University Appeal.

Mr. Brearley proposed that the Committee take into favourable consideration, and report to the next meeting upon, the matter of a subscription by the Institution to the fund being raised for Leeds University. Perhaps they could not give much; but they could do something, and small sums counted. The Manchester Institution owed so much to the Leeds University, both directly and indirectly, that they should associate themselves with the fund.

The President said they would be very glad to take the matter to Committee; and this was agreed to.

The President Congratulated.

During the proceedings, the following telegram was handed to Mr. Shapley:

> "Members of staff send hearty congratulations on honour conferred upon you, and hope your year of office will be crowned with success.—Mitchell, Leeds."

Before separating, the members took tea together.

PREPAYMENT GAS METERS.

By Frederick A. R. Filer, of the Ryde Gaslight Company.

[Before the London and Southern District Junior Gas Association, on Feb. 26.]

The mechanism of a prepayment gas meter is often blamed for a great many errors, chiefly for causing cash short or cash over; but I think there is no more accurate machine to be found anywhere. It stands in the cupboard or on a shelf, and measures the gas in return for coins, for years, with very little attention, only needing the cash box to be emptied periodically. The consumer cooks food or heats water, puts a coin in the slot when the supply is seen to be shutting-off, and is content, knowing there will be no quarterly account to be met. The collector takes the cash and reads the index. If the cash is correct with the amount of gas consumed, all is well for another few months.

Sometimes the cash does not work out correct with the index; and then comes the query. Among the theories put forward for this error are fast, slow, or backlash. I will endeavour to show how by practice these three theories can be made to vanish.

There are but few causes why cash does not agree with index. With cash short, it is wrong price-setting of either wheel or plate, disconnected valve-closing gear, defective coin carrier, or dishonesty. Cash over is due to wrong price-setting or wrong gear wheels in mechanism. I will explain in detail these defects and their effects on the cash in the box. Take the setting of the change wheel or plate. If set too high, or for more gas than should be delivered, this will cause cash to be short. If set too low, it will result in cash over. This needs no explanation. With a disconnected valve-closing gear, if the fracture or worn part is between the index spindle and the shut-off valve the index will work correctly, while the valve-closing mechanism will either cease to operate, or only work at times. Should it work sometimes, the cash will be short; if not at all, no cash will be needed, but all the gas consumed will register, assuming the valves and diaphragms are in good order. Defects of this kind which I have encountered were due to worms or wheels being worn to such an extent that they ceased to engage at times, and also to change wheels being set too tight in gear, causing the whole driving power of the meter to throw-out of gear or the mechanism to break between the index and the valve. Men whose duty it is to alter this type of price changer should know that the change wheels must be set true. If they are too tight there will be a fracture; while if too loose they will not operate the shut-off valve. Both these defects cause cash short.

In some types of meter, the coin is inserted through a plate and into a carrier, the connection to the valve mechanism being made by the coin falling between the teeth of a ratchet wheel. If the carrier becomes loose, it is possible, without inserting a coin, and by merely turning the handle, that the carrier itself will catch against and turn the valve-opening ratchet wheel, resulting in a shortage of cash. Dishonesty is another cause of cash short. Unless foreign coins or other material are found in the till, the chief difficulty is to prove that gas has been obtained without a coin. Fortunately the up-to-date meters have various ingenious attachments to prevent "pumping."

Cash over is not often encountered. The chief causes are faulty change plate or wheel-setting, or gear wheels put into the meter or attachment which will not allow the meter to pass sufficient gas for the coin. The only genuine cases of cash over which I have seen were caused by the coin missing the worm teeth of the ratchet wheel, and a double start worm being fixed in attachment when one was already, but not known to be, fixed in the meter top.

All these defects can be found by tests or observation. Those defects inside the meter require tests, but those outside can be found by examining and trying the various parts.

To show the necessity for accurate adjustment of the various parts of the prepayment mechanism, it should be noted that the pull or driving force of the tangent in a 3-light meter with 50 tenths pressure at the inlet is approximately 5 lbs., and larger meters *pro rata*.

Now I come to a few supposed causes of cash short or over. There are some people who think that with a meter fast or slow in registration, looseness of gears—or "backlash" as it is called, which if very bad requires two or more coins to open the valve—is the cause of cash errors. The fast or slow theory will vanish if we obtain a meter with the top taken off, and follow the train of wheels and worms from the centre crank to the valve, and from crank to the index pointers. It will be found that at some part, generally from the index spindle, a worm or wheel is engaged with the valve-closing gear, proving that the index and valve are operated by a common driver, the centre crank. Thus, if the meter when on test for 2 c.ft. has passed (say) 2½ c.ft., the test pointer only registers 2 c.ft. Therefore, bearing in mind the connection between the centre crank index and the valve, it follows that the valve has only closed the distance for 2 c.ft., though actually 2½ c.ft. has passed. The same reasoning can be applied to a fast meter. All the gears will work for (say) 2 c.ft., but really 1½ c.ft. for 2 c.ft. registered. Thus it will be seen that, if a meter is set to pass 20 c.ft. per 1d., it will close five times for every 100 c.ft. registered by the index, whether 75 c.ft. or 125 c.ft. has actually passed through the meter. Backlash is another theory for cash errors. A consumer who has to insert two coins to obtain a supply will probably think that value is not received for the first coin inserted. Any gas men who think this will be assured that it is not so if they get a meter with this defect and examine the gearing. It will be found that, through some part becoming worn or loose, the valve-opening parts do not operate with the first coin. A further coin or coins have to be put in. After opening the valve with more coins, set the meter to work, and watch the valve-closing gear—that is, from the crank. The same thing will be seen to happen from the meter side of the valve. All the worms and wheels up to the loose part will work, and not move the valve until the looseness or backlash is taken up. Therefore, with our meter set at 20 c.ft. per 1d., and with three coins to open, we get 60 c.ft. registered on the index.

If possible and convenient, I would suggest to anyone who is not convinced of fast, slow, or backlash not causing cash errors, to try a test. Obtain three meters with these defects, and fix

each one to the outlet of a test meter or a meter with an index reading to units. Let each meter shut off, and take note of the readings of each one. Set the test meter pointers to zero. Now open each one with coins until you have paid for 1000 c.ft., and you will find that all three will read approximately 1000 c.ft. by the index. But look at your test meters. On the fast meter test dial it will be under the 1000 c.ft., and on the slow one over; but the backlash meter, if registering correct, will agree with the test dial.

The fact that each coin will not pass the same amount of gas each time, proves that to try to test the valve of a slot meter for one coin's worth of gas is out of the question. The cause of this is that, when a coin is inserted to open a valve, the last part of the opening mechanism before the valve lever only moves in some makes about one-tenth of an inch. I worked out the movement of one to be approximately 0·02 in. To get the mechanism to deliver the exact quantity per coin, all the gears would have to work with micrometer precision. So, to obtain a fair test, take 1000 c.ft. of air or gas. Unequal amount per coin is the reason why Mrs. X complains that she is sure "she got more light for one penny last night than some other night;" but I wonder how many fitters or complaints men could explain to her why.

It may be questioned whether the coin test is of practical value. Of course, even in a small works, the task of testing all meters is out of the question; but in the case of doubt as to the cause of cash short or over, it is a good thing to know that the meter is not to blame, or that some part has ceased to work or is broken. I would recommend the use of a coin test on those meters which are queried cash short or over, and also where it is thought that the valve is not working properly. I have detailed tests of fast, slow, and backlash meters; but each will find it more interesting and convincing to make his own tests.

Fast.	Slow.	Backlash.
5-lt., shilling, 180 c.ft. per 1s.	5-lt., 15 c.ft. per 1d.	2s. to open, 5-lt., shilling, 168 c.ft. per 1s.
1s. . . . . 0 c.ft.	1d. . . . 0 c.ft.	2s. . . . 0 c.ft.
1s. . . . . 159 ,,	1d. . . . 17 ,,	2s. . . . 330 ,,
1s. . . . . 317 ,,	1d. . . . 35 ,,	2s. . . . 671 ,,
1s. . . . . 495 ,,	3d. . . . 55 ,,	990 ,,
1s. . . . . 623 ,,	3d. . . . 112 ,,	
1s. . . . . 789 ,,	3d. . . . 164 ,,	
940 ,,	1s. . . . 218 ,,	
	1s. . . . 443 ,,	
	1s. . . . 667 ,,	
	1s. . . . 894 ,,	
	7d. . . . 1112 ,,	
	1241 ,,	

Test meter readings as each coin is inserted to open valve.

—	Fast.	Slow.	Backlash.
Meter registered as passed .	1080 c.ft.	1000 c.ft	1000 c.ft.
Test meter passed . . .	940 c.ft.	1241 c.ft.	990 c.ft.
Registration error by test meter	14·90 p.ct. fast	19·34 p.ct. slow	1·01 p.ct. fast (correct.)
C.ft.	for 6s., 1080	for 5s. 7d., 1005	for 6s., 1008

An ordinary meter which is passing unregistered gas will, while registering correct at full capacity, probably cease to register with one or two small lights burning; but in a prepayment meter the error also varies with the position of the valve.

The tests I have here will show the different errors caused by various positions of the valve.

Inlet pressure 40 tenths, 3-lt. 1d. meter opened by 1d.

Outlet Set to Pass:	Test Pointer Index Reading.	Registration Error.	Distance Covered by Valve Equivalent to C.Ft. Passed.
5½ c.ft. per hour	½ c.ft.	not taken	½
5½ ,, ,,	2 ,,	41·00 p.ct. slow	2½
10 ,, ,,	2 ,,	24·81 ,, ,,	4½
17½ ,, ,,	4 ,,	11·11 ,, ,,	8½
5½ ,, ,,	2 ,,	31·50 ,, ,,	10½
5½ ,, ,,	4 ,,	50·32 ,, ,,	14½
5½ ,, ,,	½ ,,	61·54 ,, ,,	15

This meter was allowed to run on for a while, and then found to be passing 4 c.ft. per hour, but not registering. It is interesting to note how, when the valve had closed for 2½ c.ft. registered, the error was 41 p.ct.; at 10½ c.ft., 31½ p.ct.; and at 15 c.ft., 61½ p.ct.—and all giving the same light, 5½ c.ft. per hour.

Another illustration of the valve position and registration is of a 10-light 1s. meter.

Test for capacity at 20 tenths, 2·34½ p.ct. slow (correct).

Test for small quantities at 50 tenths, not registered.

Valve full open 40 tenths at inlet, and passing 60 c.ft. per hour . 2·72 p.ct. (slow)

,, ,, ,, ,, ,, ,, ,, ,, 30 ,, ,, . 0·40 p.ct.

,, ,, ,, ,, ,, ,, ,, ,, 6 ,, ,, . 50 p.ct.

But with the outlet set to pass 60 c.ft. per hour, and then the valve closed to pass 40 c.ft. per hour, this meter would not register.

I give these illustrations of registration and valve position to show that a prepayment meter off the district requires more careful testing than the ordinary meter.

Before I conclude, I would like to say a few words regarding leaky meters. All leakage from a meter is not, as sometimes supposed, unaccounted-for gas, as though it were from a main pipe. The loss from meter leaking from the outlet pipe is borne by the consumer. Leakage at the inlet pipe or backplate is the company's loss. It is not generally known, however, that a leak from the bottom, shutters, or rod stuffing boxes is shared by the company and the consumer. The loss to each depends on the consumption by the burners, and also on the size of the leak; but in all cases the gas company is the greater loser. The percentage loss to the company and the consumer is shown here, taken from a meter which registered correct with leak sealed.

Burner Consumption, C.Ft. per Hour passing at Outlet.	Leak Consumption, C.Ft. per Hour.	Quantity passed by Leak during 2 C.Ft. Test.
A . . . 40	4·5	0·20
B . . . 30	4·5	0·25
C . . . 20	4·5	0·35
D . . . 10	4·5	0·73
E . . . 6	4·5	1·12
F . . . 40	1·0	0 05
G . . . 30	1·0	0·06
H . . . 20	1·0	0·07
I . . . 10	1·0	0 15
J . . . 6	1·0	0·25

Meter Registration.	Test Holder Registration.	Company's Loss.	Consumer's Loss.
		P.Ct.	P.Ct.
A . . 2	2·13	6·10	3·63
B . . 2	2·16	7·41	4 71
C . . 2	2 23	10·31	6·38
D . . 2	2 50	20·00	12·19
E . . 2	2·81	28·82	18·34
F . . 2	2·03	1·48	1·01
G . . 2	2·04	1·96	1·01
H . . 2	2·04	1·96	1·52
I . . 2	2·12	5·66	1·52
J . . 2	2 19	8·68	3·09

An interesting experiment can be made with a leaky meter. Take a meter just repaired with valves and diaphragms perfectly sound. It must be complete, with the exception of having the top soldered on. To the inlet, supply 50-tenths pressure from a ½ c.ft. wet meter. A cock should be fixed at the meter outlet. If the meter is sound, when the outlet cock is turned off the test meter pointer will be stationary. This, by the way, is the test as prescribed by the Board of Trade. Now punch or drill a small hole in the side near the front shutter, and allow the meter to work until the tangent is just approaching, or pointing towards, the rivet on the front link. Then shut the outlet tap, and watch the meter pointer. According to the test meter, it will be found that the meter with the hole is sound; the reason being that it stopped working just as the supply to the front diaphragm box was absolutely shut off by the valve cover. If in doubt of this, which I admit seems impossible, try it for yourself, making sure that the valves and diaphragms are perfectly sound.

This curious result—leaky, but recorded sound—will serve to point out the danger of putting a light near any part of a meter *in situ*, when the outlet is stopped, or of searching for leaks in repaired meters, without burning a little gas to keep the meter working. It will also be well to note, while trying this experiment, the registration effect of a meter leaking, but not working, when all taps are closed. The loss to the company and the consumer is taken while the meter is working. When it is not working, all leakage is the company's loss.

With a leaky shutter or bottom we can get three different results which are governed by the position of the valves when the supply is turned off. While in one position the meter will work and register one-half a revolution of the tangent, and then stop working and, possibly, partly stop the leak; another position will allow it to leak continuously as though from the main; and if stopped in a position such as described in the experiment, it will cease to leak until used again.

In conclusion, I would like to thank Mr. F. W. Taylor, Engineer and Secretary of the Ryde Gaslight Company, for his kindness in allowing me to use the test reports quoted in this paper.

Discussion.

The CHAIRMAN asked the author whether complaints of "cash short" could not in many cases be traced to the valve not closing properly, and allowing a small quantity of gas to pass—sufficient for (say) one light. It was interesting to hear that, in instances when a consumer could get no gas for one coin, insertion of a second coin allowed two coins' worth of gas to pass. Mr. Filer had given no particulars about pressure absorption in meters, which was a very important matter. While a great deal was heard as to the policy of overworking meters being decidedly bad, he must say that some of these statements appeared to be exaggerated. It was surprising how much gas a 3-light meter would pass. It could be worked at 60 c.ft. an hour with a pressure drop of only 3-tenths.

Mr. FILER said that if the valve did not close properly, but allowed

the passage of a small quantity of gas, this gas would pass unregistered. Regarding the overworking of meters, better results could certainly be obtained at the rated capacity. Overworking was apt to strain the leathers, rods, and packing boxes; and many a leaky index could be traced to this cause.

Mr. J. R. GALE (North Middlesex) remarked that the Government inspector, in testing prepayment meters, paid no attention to the cash attachment; the meters were merely tested for accuracy of registration and leakage, as was the case with ordinary ones. Concerning complaints of cash over, it was the policy of his Company to read the index; and if it was discovered that less gas had been registered than was paid for by the consumer, the balance of cash was always returned to him.

Mr. FILER suggested that if the Government inspector had to examine the prepayment attachment as well as to test the meter for accuracy of registration and for leakage, the time required would be enormous; and for this reason he thought the idea impracticable. For a test of the prepayment mechanism it was necessary to pass at least 1000 c.ft. of gas, which had to go through the meter at a rate of about 18 c.ft. an hour. Consequently the cost of Government tests would be great.

Mr. W. R. MOGER (Tottenham) said that once on testing an ordinary meter, when the gas passed from the inlet to the outlet, he found a leakage. On reversing the flow of gas, however, there was no leakage. Could Mr. Filer account for this?

Mr. FILER said it occasionally happened that, if the gas was passing over the valve, the leakage was shut off at a particular moment. This shutting-off probably occurred in the case cited by Mr. Moger.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

Visit to the Street Mains Section of the Glasgow Corporation Gas Department.

On Feb. 27, the Association visited the Street Mains Section at Glasgow, where a highly instructive series of exhibits was arranged for practical demonstration, under the supervision of Mr. Edison Stones, Assistant General Manager. The party were welcomed by the Convener, Bailie Paterson, and the Sub-Convener, Bailie Walker.

Mr. Stones explained that the management desired that the Juniors should see every important phase in the work of a street mains section. Many of those present had not every-day opportunities of seeing the many different operations carried out in a large undertaking; consequently there had been fixed up for practical demonstration as many processes as time allowed. The following programme gives the most important items dealt with during the visit:

Tapping and screwing cast-iron and steel mains, including the use of Parkinson expansion nipples.
Jointing cast-iron and steel mains.
Testing mains for soundness after laying (air and soap methods).
Testing wrought iron service pipes:
(*a*) On delivery, by special air test under water. All pipes coming into the yard are tested on the machine shown on accompanying photographs.
(*b*) On completion of service, by means of gauge and soapy water.
Use of bladders in small and large mains.
Mechanical diggers, punners, and caulkers in operation.
Effect of tapping main for too large a service connection.
Rack and pinion valves as compared with plug valves.
Method of wireless main and service pipe location.
Leakage detection.
Cutting large and small mains.
Under-pressure drilling appliances; inserting split tees without stopping the gas supply.

Mr. ROBERT GRAY (Hamilton), President, proposing a vote of thanks to Mr. Stones and his Assistants, assured him that every one present would benefit very much from what they had seen. Some of the operations were known to them only from text books; and it was most helpful to see the work actually carried out.

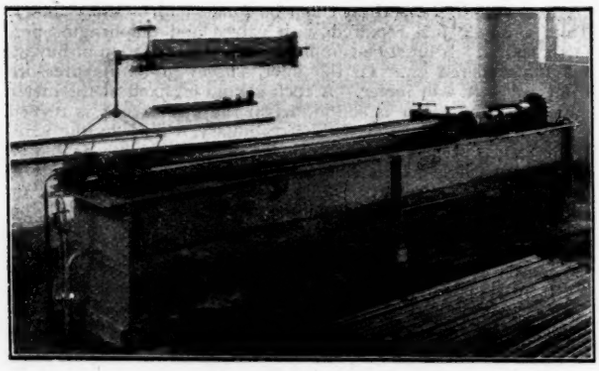


Fig. 1 shows W.I. (½ in. to 6 in. diameter capacity) Tube Testing Machine at Street Mains Section, Glasgow Corporation Gas Department. Fixed on the wall is the tube measuring and weight testing scale.

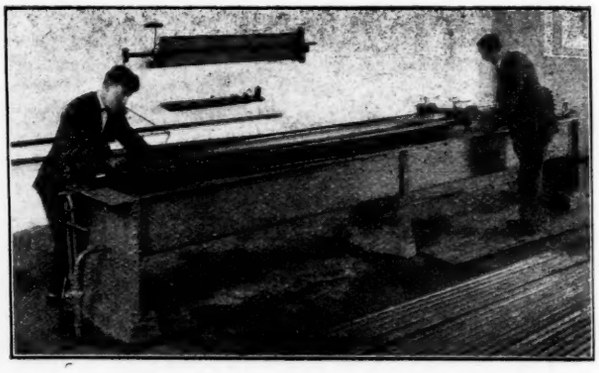


Fig. 3.—Placing Tube between Chucks prior to lowering under Water.

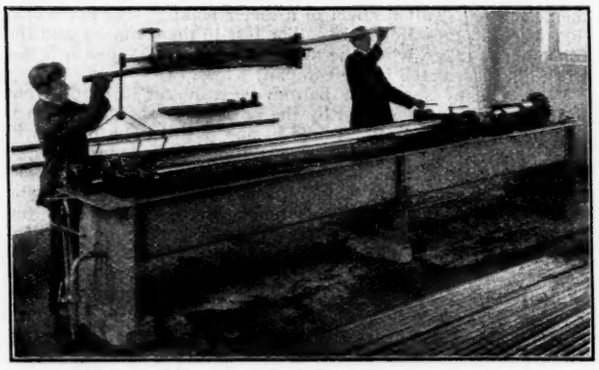


Fig. 2.—Examination of Interior of W.I. Tubes prior to Test for Soundness.

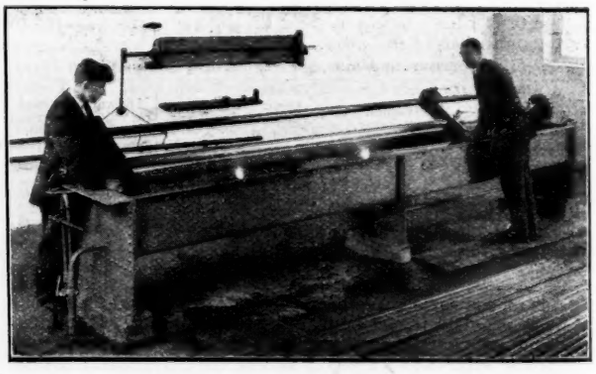


Fig. 4.—Tube under Water with Air Test at 40 Lbs. per Sq. In. This photograph shows detection of faulty weld in pipe. The compressed air control is near the hand of the operator on the left.

London and Southern District Junior Gas Association.—A meeting of the Association will be held at the Westminster Technical Institute on Friday, March 26, when Mr. F. E. Hobley, Assoc.M.Inst.C.E., will read a paper on the "Treatment of Boiler Feed Water."

North British Association of Gas Managers.—The annual spring meeting of the Association will be held in Motherwell on Friday, April 2. Members will meet together for lunch at 12.45 p.m., and the business meeting will follow immediately afterwards.

FIRST TWO PRIZE ESSAYS IN "B.C.G.A." COMPETITION.

The first two Prizes (£200 and £100) were divided equally into two Prizes each of £150 awarded to the authors of the following Essays.

HOW THE GAS INDUSTRY BENEFITS THE HOUSEWIFE, THE ARTISAN, THE MANUFACTURER, THE CITY, AND THE NATION.

(I.)

By Mrs. Dorothy M. D'Eath, M.A., of Chingford, Essex.

Note.—In defence of the form of this essay, may I be allowed to quote as precedents Pope's "Essay on Criticism" and "Essay on Man?"

Gas and its glorious benefits I sing!
(With humble quaffs of the Pierian spring)
And call upon the Muse to help my pen
Describe its peerless services to men.
The listless Muse rejoices at the word:
"For it is true I never have demurred
With such romantic theme before me laid;"
And in my mind has eagerly arrayed
Amazing thoughts of ages long ago . . . .

Unchecked and vast, primeval forests grow
And flourish, in the sunlight's fertile heat—
Another æon sees their sad defeat
As, slowly sinking to the earth, their grave,
The trees are buried. But the ages save
Their boon of sunshine, and it lives again—
As Coal they now give light and warmth to men.

But Britain's store of coal, however vast,
Could not in truth *ad infinitum* last.
With swift annihilation it was faced
Without some policy of checking waste.
One Murdoch was the canny Scot who saw
That *baking* coal would from its riches draw
Not only heat, but light (as gas) as well!
A wiser pen than mine 'twould need to tell
The store of riches in that coal interned,
Which otherwise are in the fire all burned.

The busy housewife, as she plies her trade,
And cleans and cooks with ardour undismayed,
Will tell me why it is that now she smiles,
Why many a daylight hour she now beguiles
In pursuits pleasant (though she once was cross
And weary, always clearing out the dross
Of grates, and stoking fires and chasing dust).
Her morning tasks are quick and easy, just
To turn a tap—her parlour fire is bright
(No coaxing of reluctant fires to light).

Her gas-rings soon will see the kettle boil,
The porridge simmer, and the bacon broil;
Her kitchen's cosy with a "Sentry" stove,
Where coke keeps water hot as heart of Jove.
Gas boils the copper, washing soon is done—
Behind a cloud retires the bashful sun!—
But soon the clothes around gas fires are dried,
And ironed too (the gas-iron is her pride).
And baking-day is equally a joy:
No scorching, wasteful fires to annoy,
But hot or moderate oven, as she wills.
Her comfort's doubled, and reduced her bills.

And when night finds her, in the sunshine glow
Of gaslight, joining in the merry flow
Of children's chatter, does she ever think,
I wonder, how gas forms a shining link
Between the burden'd womankind of yore
And glad enfranchised women who now more
And more their country's progress aid?
For gas it is that in her life has made
More freedom and more interest—and locks
Up half her troubles in Pandora's box!

Her husband's daily toil is lightened, too
(Apart from all the blessings that accrue
To him at home, where better health and food
And comfort, make him feel that life is good),
For in his workshop (he's an artisan)
Now gas is used, the heat not only can
Be easily and readily obtained,
But steadiness and more control are gained.
The flame he now can fix and localize,
Or spread combustion over any size
Of surface, change the kind of burner, too,
According to the work he has to do.
And since efficiency is guaranteed,
By using gas; and since there is no need
To waste the flame between each crafty part
Of every process: since he has more heart
And energy to bring to every task
(Due to conditions good), he soon can ask
And merit better wages. Thus is health
In many ways a vital part of wealth.

The manufacturer is saved the cost
Of storing fuel, and the labour lost
Unloading coal, and carrying to and fro,
And stoking furnaces; the ceaseless row
Of strength and time in cleaning up the dust,
And ash and soot (which wasteful labour *must*
Direct combustion follow). He has proved,
While best for intermittent use is gas,
For constant service nothing can surpass
In raising steam and heat, the use of coke,
The cheapest, cleanest fuel, free from smoke,
And that alone would set its value high—
That Demon Smoke it helps us to defy.

For smoke has been for long our cities' curse,
A drain upon our health and on our purse,
Whose fœtid vapours in the atmosphere
Have helped disease his dreadful head to rear,
His maw with wretched victims helped to fill.
This smoke condemns us in a cloud of chill
And filthy fog, to wander in dismay,
Unable to distinguish night from day.
Even into the country smoke will spread,
Polluting grass on which the kine are fed,
And thus contaminating milk and meat.
Corrosive acids in the smoke will eat
Into the very fabric of our proud
And priceless buildings, and there is a loud
Demand for capital to pay the cost
Of restoration. What a sad impost
On life and property is levied by
The Demon Smoke! Our *duty* to defy
His greedy appetite and power cruel
By using gas and coke—the smokeless fuel.

Our duty to the nation thus is shown
From point of view of health, yet that alone
Is not the vital point. Far-seeing eyes
Take stock of Britain's coal, and realise
That as it forms our only source of heat
(For we have neither wind nor wood nor peat
Nor water power sufficient, and no well
Of oil, like other countries who compel
To servitude these springs of energy,
As fuel for heat and power), coal must be
The key of Britain's greatness, and the source
Of commerce wide, and industry, and force
Of arms. We thus are closely faced
With swift extinction if the reckless waste
Of coal continues. Let us rather choose
To practise keen economy than lose
Our Nation's wealth and greatness!—Let us choose.

The treatment of our coal by which we lose
Least of its goodness and potential heat . . .
For scientists have proved that if we treat
The coal by baking it, we save per cent.
Quite seventy-seven point five of its content.
This figure clearly goes to indicate
(When we discover that to generate
A modest twelve per cent. of electricity
Requires the highest known efficiency).
That conservation of our fuel depends
On coke and gas. For their production sends
By-products into industry—benzol,
And pyridine, and tar, and toluol,
And artificial dyes, and oils, and pitch,
And many other substances of which
A number helped us the Great War to win.
In every patriot's eyes, 'twill seem a sin
To let combustion eat away and steal
In smoke these workers for the public weal. .

A century of service gas has seen.
In peace as well as war-time it has been
Our ally . . . Let each fuel's progress be
Dependent on its own efficiency;
Let every fuel service freely give,
Developing on lines competitive
It will be proved that nothing else can beat
The industry of gas for giving heat.

(II.)

By John Henley, of Glanmire, Co. Cork.

"That which we have we prize not to the worth
Whiles we enjoy it, but being lacked and lost
Why then we rack the value, then we find
The virtue that possession would not show us."
—Shakespeare.

What shall we do with our inheritance? "To get goods is the benefit of Fortune, to keep them the gift of Wisdom." In our keeping lies the concentrated essence of past æons of sunlight, though we fail to realize either the value of our treasure or the magnitude of our responsibility. Shall we continue to blaze a trail of ruthless destruction across our

age, squandering in riotous waste those gifts of the past which, once destroyed, no wealth can repurchase? Shall we be known to posterity as wise providers, or as criminal spend-thrifts? On our future attitude to our coal supplies rests the verdict.

We can continue largely to burn it as we have been doing heretofore, destroying what no chemist can rebuild, curtailing the supply of invaluable drugs and disinfectants to the sick and ailing, blotting out from the world its wonderful range of artificial colours, and stinting to the soil those necessary fertilizers on which our food supply depends. Worse still, we can continue to offer sacrifice to the modern Moloch we have enthroned in our skies, feeding him with a poisonous pall of smoke, endowing him with filthy grime and corrosive acids to befoul and gnaw away our triumphs of architecture and our treasures of art, equipping him with invisible fingers to probe into our lungs and vitals and plant there the seeds of decay and death.

The gas industry, however, is both able and ready to save us from the guilt of a national sin of such appalling gravity. High-temperature carbonization, with coke and gas as the main products, is the only alternative to this orgy of destructive combustion. Electricity, despite its spectacular triumphs and its fascinating spell over the popular imagination, offers less help than the falling raindrops. Not being a source of power, but merely a transformation of pre-existing power, it represents a rigorous exchange in the energy market of nature, and, from the human standpoint, an exchange always below par.

Electric transmutation is the obvious mode of conversion where natural and inexhaustible supplies of kinetic energy are running to waste. In England these gifts of nature are practically negligible, and we have to pay for our heat and power with the treasures of our mines. To effect the exchange, however, by burning bituminous coal, differs only in degree from using the contents of the British Museum for the same purpose. Seeing that our stores are strictly limited and irreplaceable, the simple argument is conclusive that carbonization actually secures us over three-quarters of the potential energy of coal, as against less than one-fifth from direct combustion in the mammoth generating station of the future. But this finality on the purely logical side is buttressed by such an overwhelming array of advantages to the individual, to industry, and to the nation at large, that no sane person can remain in doubt as to his duty.

To the busy housewife gas is the modern Fairy Godmother, eliminating at once the labour of fire-building and the dreary aftermath of ashes and dust. Where gas comes in, worries go out. Much, indeed, might be sacrificed to banish from the household the heavy coal-bucket, the pile of firewood, and the dirty flue, with their accompaniment of tired muscles, frayed nerves, and ruffled tempers; but no sacrifice is needed. Gas is marvellously adaptable to every domestic need, as well as being the cleanest, safest, and cheapest fuel in existence. It enters the house silent and invisible. It is instantly ready for use day or night, for minutes or for hours. It can be had in pennyworths. It cooks, bakes, and heats with greater economy, greater reliability, and greater success than coal; and in the single instance where an absolutely continuous supply of heat is needed, coke is ready to take its place and maintain a similar level of advantage. Taken all in all, the gas industry offers to the harassed housewife the charter of her emancipation.

To the artisan or mechanic, gas is an undisguised benefit. Its constancy and reliability provide him with better-cooked meals, and allow his domestic time-table to be arranged with that absolute precision demanded by the most exacting employment. In his actual work gas is also a friend beyond price. It can be brought anywhere, and will do anything that heat can do—boiling, melting, paint-burning, brazing, soldering, tempering, and all with that assured certainty which delights the heart of the true craftsman.

To the manufacturer gas comes with a guarantee of profits, reducing his overhead charges, and setting free every square foot of his factory space. Its extraordinary flexibility renders it adaptable to all technical processes where heat is needed. Compressed in steel cylinders, it can be brought to the top of the highest mountain, or the bottom of the deepest mine. At will it can be used for oxidizing or reducing, from a jet as delicate as an artist's brush to a roaring sea of flame in which the metals run like water. By its constancy of composition, dependability of performance, and special adaptability to thermostatic control, it lifts manufacturing processes from the plane of haphazard groping to that of automatic certainty, and guarantees at once a better product and the elimination of failures and rejections. When the need for solid fuel is imperative, as for steam raising in quantity, or electrical generation, smokeless coke in grades suitable for all industrial purposes is available. No plea need be entered on behalf of the laboratory—the brain of modern industrial processes. Gas has there won an assured place as an indispensable instrument of research.

To the city, gas is a public benefactor, cutting-down cleansing charges, reducing building costs, lighting large areas at minimum expense, obliterating fog, saving its architecture and civic posessions from the pollution of smoke, and raising the level of communal health and efficiency. Man's greatest enemies are not the things he can see, but rather those invisible potencies that lurk in the air he breathes. We have all read much about the horrors of poison gas; but we continue to allow our large cities to be little else than huge cauldrons for its manufacture and dissemination. As with an infected person, so with a coal-burning city, the danger spreads far beyond the affected unit. It is a definite scientific fact that the volcanic dust from the Krakatoa eruption of 1883 spread over the whole world! Who, then, can definitely circumscribe the malign influences of 40,000,000 tons of coal burned each year in Great Britain for domestic purposes alone? With the adoption of gas the blight disappears.

To the nation the gas industry comes as a saviour in peace and an ally in war. Its benefits, direct and indirect, permeate the whole social and industrial fabric. Indirectly, by ensuring a pure atmosphere, it raises the tone of national health and checks infant mortality, it increases the yield of food crops and improves the quality of cattle, and it guarantees the maximum supply of God's sunshine and light—the harbingers of health and the foes of disease. Directly, it extracts from coal with minimum loss its latent heat and power—the sinews of industry. It has given, and still gives, to chemistry the raw materials for its most brilliant triumphs. It offers to industry the only assured basis upon which world competition is possible. Lastly, it opens the way to a new and startling era in power development, when research in engineering and metallurgy will have finally assured the practical success of the gas turbine.

Unfortunately, no nation dare organize its energies for peace alone, and war remains at least a possibility. In the interests of national self-preservation, be it borne in mind that the gas industry alone provides the wonderful range of chemicals which are vital in the production of dyes and high explosives. Thus it holds the keys of defence.

Britannia's rule over the waves has been a truism in past history; but peoples, like individuals, perish from internal disorganization rather than external aggression. In the future competition of the nations, England will rule neither the waves nor the land, unless she first rules her coal.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Crewe Works of the L.M. & S. Railway Company.

On the morning of Saturday, March 6, members of the Association visited the locomotive works of the L.M. & S. Railway Company at Crewe, by permission of the Mechanical Engineer, Mr. H. P. M. Beams. At present re-organization is in the progress; and when completed, these works will be the most up-to-date in the country.

In the afternoon, the members were received at the gas-works by the Gas Engineer, Mr. T. H. Williams, Assoc.M.Inst.C.E. (a member of the Association), and were conducted round the extensive works.

A new 1 million c.ft. 3-lift spiral-guided gasholder has recently been erected; also a set of ferro-concrete purifiers and new condensing plant. Complete charging and discharging machinery has been added, and new settings have been built in the existing retort house. The contractors for the work were C. & W. Walker, Ltd.; Gibbons Bros., Ltd.; and Lind & Co.

Following the inspection, the visitors were entertained at tea by the Company.

The President (Mr. J. T. Haynes, Assoc.M.Inst.C.E.) complimented the Railway Company on their excellent works. They had every reason to be proud of them and of their staff.

Mr. J. Alsop (Hon. Secretary) moved a vote of thanks to the Railway Company, their Mechanical Engineer, and the Works Manager.

Mr. Williams, in reply, remarked that the Manchester Juniors were the first Gas Association to inspect the works.

Mr. Millwood (Messrs. C. & W. Walker) expressed his pleasure at meeting the members, and remarked that a large engineering works was seldom tacked on to a gas-works, so that their visit had been singularly interesting. Speaking of the purifiers they had seen, he favoured the usual cast-iron ones rather than ferro-concrete.

Wales and Monmouthshire Junior Gas Association.—A meeting of the Association will be held on Saturday, March 13, when a visit will be paid to the works of the South Wales Power Company, Upper Boat, Treforest. Subsequently Mr. C. Bateman, of Bath, will read a paper on the "Neutralization of Sulphate of Ammonia."

Novel Calendar.—One of the best novelties received this year in the way of a wall or desk calendar is from the Koppers Coke-Oven Company, Ltd., of Glossop Road, Sheffield. It has a stamped metal face of ornamental design, through openings in which, and by means of revolving discs, the month and date are shown.

LONDON JUNIORS—ANNUAL DINNER.

The thirteenth annual dinner of the Association took place at the Criterion Restaurant, Piccadilly Circus, on Friday last, March 5, when well over a hundred members and guests had a thoroughly enjoyable evening. The chair was taken by Mr. W. L. Westbrook, the President; and among those at his table were Messrs. E. V. Evans, Chief Chemist of the South Metropolitan Gas Company; John Terrace, Chief Engineer of the South Suburban Gas Company; H. C. Smith, Chief Engineer of the Tottenham District Light, Heat, and Power Company; Stephen Lacey, Deputy Controller of Gas Sales of the Gas Light and Coke Company; and S. B. Chandler, of the Tottenham Company.

After the honouring of the Loyal Toast, at the call of the President,

Mr. H. C. SMITH proposed "The Association." The position occupied by the Junior Associations to-day, he said, was more important than ever before. The problems the gas industry had to face were becoming increasingly difficult. The junior gas engineer of to-day was the senior engineer of to-morrow; and he depended for his technical equipment very largely on the Junior Associations. It was, of course, most important that the gas engineer should have a thorough technical grounding. He could receive his practical training on a works, and his theoretical knowledge at a university or a polytechnic institution; but it was at meetings of his Junior Association that he was able to reap the benefit of combination of the theoretical and the practical. The old saying that dividends were made and lost in the retort house was still as true as ever. No matter how good the administration of an undertaking might be, unless the technical control was as it should be, and the works were well managed, no amount of energy and skill in the distribution department could regain what would have been lost. Nowadays it was not such an easy and simple proposition to sell gas as it was when the only competition met with was from oil and candles. Now there was electricity as well, which they would admit had in some directions certain advantages. Competition had led to the setting-up of departments concerned solely with gas sales—or, perhaps, he should say gas service—towards the training of the personnel of which the London and Southern District Junior Gas Association had certainly done its share. The gas sales or service department was an extremely important one; and so much stress had been laid lately on this side of their business that they had sometimes almost been led to believe that the art of selling was of greater import than the art of manufacture. That this impression might have been formed was a tribute to those gentlemen on that side of the industry who had distributed their propaganda so ably. There used to be two main sides to their industry—manufacture and distribution. It could now be said that there was a third side—the gas service section. In considering these three departments, they must preserve their sense of proportion. Unless a works was efficiently managed and maintained, profits were lost which could not afterwards be regained. Unless the distribution system was adequate in capacity, and the department governing this system was able to supply at an ample and even pressure the clean gas of a constant quality and composition which the works should manufacture, then the gas sales department was severely handicapped, and, indeed, might be rendered practically useless. If after persuading consumers to instal apparatus it was found that, owing to a gas supply of varying quality and pressure, these appliances could not be used efficiently, the service department might be a positive disadvantage to an undertaking; for, while a satisfied customer was the best advertisement that any gas concern could have, a dissatisfied consumer was certainly the worst. Mr. Smith observed that they must not think that he was in any way underestimating the value and importance of the gas sales department. Nothing was further from his mind. He merely wished to stress the fact that this section of their activities depended absolutely on the technical departments. There was a growing need for the gas engineer to make himself thoroughly efficient. The papers which had been read before their Association, and the discussions that had followed, had been of a high order; and this was not the time to relax any efforts in this direction. They doubtless had in their minds the Government proposals regarding electricity. What these proposals were they did not yet know in any detail. What they would eventually develop into as a Bill they knew still less. As far as they were able to judge at the moment, the Government seemed to be so well satisfied with the manner in which it had reduced expenditure that it had looked round to try to find an industry which required a little financial assistance and Government control. The choice had fallen on that very necessitous industry the electrical industry. Some electricity companies were only paying a paltry 15 p.ct. dividend. Obviously some help was needed. They were now assured that there was to be no subsidy, but only a guarantee. There were cases in the English language where the same words might have two entirely different meanings; but perhaps this was an instance of two different words having the same meaning. They had been led to suppose that all the smaller generating stations were to cease to function as such, and were to become distributing centres. The current was to be generated at a few super power stations. Imagine the cost if the gas industry was told to close down all the small works, and manufacture all their gas at (say) six large stations. The expense would be enormous; and bearing in mind that wholesale re-adjustment, alteration, or scrapping of appliances, &c., would be a far more serious matter for the electrical industry than for the gas industry, it was most difficult to see where the "cheap and abundant supply of electricity" would come in. However, whatever the electricity proposals might be (and he for one did not feel at all nervous about them), the fact remained that the electricity industry had received a tremendous and unfair advertisement. And the Government's boosting of their chief competitor did make it essential to use their utmost endeavours to give to the public the best service possible. It was in this direction that the Association would, he felt sure, play its part in the future as it had done in the past. The speaker said he would like to mention one piece of work which largely concerned the Association, and in which he knew they were all keenly interested. He referred to the Education Scheme of the Institution of Gas Engineers. They were probably all looking forward to the time when admission to membership of the Institution would depend not only on the position occupied by the applicant, but also upon his capacity to satisfy a Board of Examiners that his practical and theoretical technical knowledge was of such an order as to qualify him for membership. A big step in this direction had been taken by the setting-up of the education scheme. He was sure this was largely the result of representations which had been made by the London and other Junior Gas Associations. When it was decided that the passing of an examination should be a necessary condition for membership of the Institution, said Mr. Smith, he would only be one of many to appreciate a change which would do much to raise the status of the Institution and of the gas engineer. Unfortunately the Institution had no building of its own; and on occasion had had to borrow that of the Institution of Electrical Engineers. They certainly hoped that the time would soon arrive when they had a home sufficient for all their needs. He had learned from Mr. Goldsmith that the London and Southern Gas Association was nearly a quarter-of-a-century old, and that the membership was now 324. Among this number were men well known in the gas industry—men who were occupying responsible positions. And he was sure that these men would be the first to admit that they had been helped to those positions very considerably by the experience and information they had gained while junior members of the Association. He had to couple with this toast the name of Mr. Westbrook; and he did this with the greatest pleasure. He had come into contact with their President on several occasions during the past few months, when he had attended the Committee meetings of the Senior Association as their representative; and, said Mr. Smith, he had always been impressed with the modest but firm manner in which he had put forward the views of the juniors. He would like to congratulate them upon their choice of a President who had most worthily upheld the traditions of his predecessors, and who had set an example for his successors to follow.

Mr. ARTHUR BROADBENT (Senior Vice-President), who responded, thanked Mr. Smith for his encouraging remarks. They had heard from him that they must prepare themselves to meet keen competition from electricity. To his (the speaker's) mind, they could help to equip themselves for this task by visiting various works and workshops, in this way broadening their outlook. And for the facilities which were offered the Association in this respect their thanks were due to the directors and the engineers of these works. That the facilities were greatly appreciated by the Association was evidenced by the large numbers who turned out for these visits. He was glad that Mr. Smith had mentioned the education scheme; and he thought that the Junior Associations could rightly claim to have been the prime movers in this development, which would undoubtedly have a far-reaching effect on the future of the gas industry. In this connection he considered it only fair to refer to the excellent work of Mr. Chandler.

The toast of "The Visitors" was in the hands of Mr. WALTER GROGONO, of the Gas Light and Coke Company, who coupled with it the name of Mr. Stephen Lacey.

Mr. LACEY, in reply, said he was sure the visitors were proud to be with the Association, which certainly did an enormous amount of good work for the gas industry. It was a junior association only in the sense that it was young and energetic; and he hoped it would always be characterized by these qualities.

Mr. NEWTON BOOTH, who was last year's President of the Association, proposed "The President." It was, he remarked, one of the privileges of being President that in the year following he could propose this toast. He had worked very closely with Mr. Westbrook during the past three years, and had been able to appreciate the sterling qualities of their President, who was, he understood, trained for the gas industry in the Midlands. From there he went to Hereford, where, under the guidance of Mr. W. W. Townsend, he had gained considerable knowledge of distribution work. It was fifteen years since he joined the staff of the North Middlesex Gas Company, and he had risen to the responsible position of Distribution Superintendent—the responsibility of which office had increased greatly during the last few years. He had been appointed one of the Examiners in connection with the education scheme; and this in itself showed in what esteem he was held by the gas profession in general. If, said Mr. Booth, he were asked what was the outstanding characteristic of their President, he would say it was thoroughness. This quality marked everything he did.

Mr. WESTBROOK, in reply, said he undoubtedly owed much to the influence of Mr. Townsend. The birthplace of his technical experience, however, was Southampton, where he worked under the direction of Mr. A. Grafton. After paying a tribute to the work of Mr. Chandler for the Association, Mr. Westbrook urged upon members the value of preparing papers. He then went on to suggest that gas undertakings could do a great deal to benefit themselves and the Association by encouraging members of their staffs to attend the meetings and visits of the Association, and allowing them time in which to do so. It was also very desirable that gas companies should help to meet the expenses of members of their staffs in this direction. The North Middlesex Company offered such facilities; and he thought that in doing so they showed far-sighted vision.

The remaining toasts were "The Secretary and the Treasurer," proposed by Mr. LEONARD LACEY, who is Junior Vice-President, and replied to by Mr. J. H. GOLDSMITH and Mr. H. F. G. SOAR; and "The Press," which was submitted by Mr. A. TENNANT.

MECHANICAL RETORT CHARGER FOR THE SMALLER GAS-WORKS.

An efficient retort charger designed for gas-works having outputs varying from 20 to 100 million c.ft. per annum—*i.e.*, the smaller works—is manufactured by Herbert Morris, Ltd., of Loughborough. For small works employing only one stoker per shift, the charger is generally used without the addition of mechanical coal handling plant. For works employing more than one stoker per shift, the firm advise a complete coal handling and retort charging plant, comprising coal elevator with its driving engine, coal storage bunker, and charger. When the retort house is wide enough, the coal bunkers may be put inside the building. Usually, however, the width of the retort house is limited, and then the bunker is erected outside the house, with the coal feed, by gravity, through the wall into charger scoops. The working of the plant is simplicity itself. Coal is discharged from bottom-opening railway wagons, or tipped from road vehicles, on to a grid covering the receiving hopper of the elevator The latter is of the bucket type, and is driven by a small steam or gas engine. It elevates the coal into a storage bunker of 40, 60, or 100 tons capacity, as required. The bunker is usually made big enough to hold the maximum amount of coal during any holiday period. Coal is drawn from the bunker by a simple mechanism, giving perfect control and a regular feed along the length of the charger scoops. The charger then swings round, and runs the charge into the retort. A simple operation turns the scoop over, thus discharging the coal. The scoop is then withdrawn. The filling of the scoop, charging, withdrawing, and closing the retort door takes less than one minute. The coal is not touched with the shovel from the time it reaches the gas-works until it is carted away as coke. Where this complete Morris system has been tried, carbonizing labour costs have been reduced by 60 p.ct., it is stated. In one case the costs were reduced from 7d. to 4d. per 1000 c.ft. This simple retort charger can be easily operated by one man—in fact, a lad can work it. The firm also manufacture a discharger for through retorts. This machine travels along the retort house on the same rails as the retort charger. The discharging mechanism consists of a telescopic ram connected to a propelling gear worked by a crank handle.

ILLUMINATING ENGINEERING SOCIETY.

At a meeting of the Society held at the Royal Society of Arts on Thursday, Feb. 25, the aims and objects of the British Engineering Standards Association were outlined by Mr. P. Good, and three recent specifications—one for portable photometers, another for industrial reflector fittings for electric lamps, and a third the British standard glossary of terms used in illumination and photometry, which was mentioned briefly in the "Journal" for Jan. 20—were introduced respectively by Lt.-Col. Kenelm Edgcumbe, Lt.-Commander Haydn T. Harrison, and Mr. Good.

The last-named said that the B.E.S.A. is an entirely independent body; its object being, through simplification and standardization, to eliminate national waste, facilitate production, and simplify tendering. It does not embark on work on its own initiative, but only on demands from outside; and it acts generally at the specific request of an authoritative body. The sole authority is vested in a Main Committee, consisting of 30 members, 21 of whom are nominated by the leading technical institutions. To keep abreast of invention and progress, and to prevent crystallization, specifications are reviewed periodically, and any improvements or modifications which experience has shown to be desirable are duly incorporated in a revised edition. The Sectional Committee on Illumination, which is of a thoroughly representative character, concerns itself with any questions of standardization within the field of illuminating engineering.

In drawing-up the specification for portable photometers, said Lt.-Col. Edgcumbe, two difficulties had to be faced. Entirely new ground was being opened up, and photometers in general—portable ones in particular—had not developed upon universally accepted lines. The Committee had to decide whether to deal with portable photometers in general, or to narrow the scope of the specification to cover those of the more utilitarian pattern only. The latter course was decided on as being the most likely to fill immediate needs. Such instruments fall broadly into two classes—those for exterior use (e.g., for street lighting) and those for interior use (factories, &c.). The ranges for these two classes were fixed as follows: For interior use, from 0·01 to 2 (preferably to 5) foot-candles; and for exterior use, from 0·2 to 20 foot-candles, or preferably higher. A photometer scaled from 0·01 to 30 foot-candles, for example, is a practical proposition, and would fulfil the requirements of both classes.

Determination of Carbon in Coal.

In the determination of carbon in coal by the combustion method, in which the oxidation of the products is completed over heated copper oxide, the ultimate products—carbon dioxide and water—may not be quantitatively formed. The deciding factors are the temperature of the layer of copper oxide, and the time during which the products of combustion are exposed to the full temperature. Writing in the January issue of "Fuel in Science and Practice," J. D. King and D. MacDougall describe experiments made to determine what temperature could be accepted as a safe one under standard conditions, and also to ascertain what time of contact of the gases with the copper oxide was necessary for their complete oxidation. The standard conditions in question were those of the Sampling and Analysis of Coal Committee of the Fuel Research Board. (Physical and Chemical Survey of the National Coal Resources; No. 2 Interim Report on Methods of Analysis of Coal.) They suggest that the method might be elaborated to state that the time required to burn the coal should not be less than 30 minutes, and that the total time of one determination need not be greater than 120 minutes. The temperature at the centre of the layer of copper oxide should not be less than 800° C. At this temperature, even with rapid heating, there is no likelihood of the loss of carbon being greater than 0·15 p.ct. The length of copper oxide necessary for complete combustion of the carbon is well within the 45 cm. specified by the standard method. Consistent results are easily obtained if a temperature of 800° C. is maintained over a minimum length of 20 cm. of the copper oxide layer. At temperatures lower than 800° C., the amounts of carbon escaping combustion increase. At 700° C. and at 650° C., results to within 0·3 p.ct. can be obtained by careful manipulation, but the tendency exists for variations to occur of over 1 p.ct.

Laying a 12-Inch Steel Main.

The Western United Gas and Electric Company supply gas to about 65 towns in Northern Illinois. These towns represent an area about 40 miles wide and 85 miles long, and are supplied from a central plant located near Joliet, at the extreme southern end of the territory. From this point there are at present two transmission mains running northward; but rapid development has called for a third one, 18 miles long. According to the "Stone & Webster Journal," this new main is being constructed of heavily coated 12-in. steel pipe, in average lengths of 35 ft.; each length weighing about 1600 lbs. The joints are being welded by the acetylene process. Three men, with a crane, work ahead lining pipe for the welders. They first line two lengths, which are immediately welded together. When several of these two-length sections are completed, they are welded into four-length sections, and then into eight-length sections. Four welders do this work, each having a helper to turn the pipe, &c. These eight-length sections are next handled by the 5-ton crane, and placed in position for welding into a continuous line. This requires stationary welds, and is done by two welders with a helper. One of these welders is the foreman, who also supervises the lining of the eight-length sections. The crane, after having lined-up several of these long sections, moves back to lower the pipe into the trench (dug by machinery), previous to which the pipe is, of course, tested with gas. The new main at its starting-point is connected with an 8-in. high-pressure main, so that an adequate supply of high-pressure gas is available for testing. A Dresser cap is placed on the open end of the main, and the nearest valve which has been closed (and which has high-pressure gas behind it) is opened. All welds are gone over with soapsuds, and any leaks discovered are repaired. The valve is then closed, and the Dresser cap removed, after which the trench is back-filled. In one day five welders have made 34 welds, the digging machines have opened 1800 ft. of trench, and the back-filler has filled-in 2000 ft.

Royal Metal Trades' Pension and Benevolent Society.—In 1893 the late King Edward, when Prince of Wales and Patron of the Society, presided at the jubilee festival. The Prince of Wales will be present at this year's celebration, the 78th anniversary festival, which is to be held at the Guildhall on June 1. His Royal Highness, by this gracious act, comes to the aid of the Board of Management in its uphill task of securing for the Society's pensioners an adequate addition to the pension allowance to meet the increased cost of living, and of effecting a necessary extension of its benevolent activities. The Society, owing to lack of funds, is not only unable to increase its pension above the pre-war basis, but is obliged to withhold it from applicants worthy of assistance. The great trade with which the Society is associated is appealed to for adequate and enhanced support. Encouraged by the interest of the Prince of Wales, the Society is determined to make this occasion the opportunity of asking the metal industries to provide an addition of £10,000 a year to the present income. The Society exists to provide pensions, financial assistance in illness and misfortune, and convalescent home treatment to men (and their widows) and women employed in the metal trades.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Developing Policy.

Sir,—I have been following with great interest your editorial articles and notes respecting the efficiency of gas supply. You will no doubt remember that in 1918 the Daily Press and some eminent politicians were advocating the use of electricity for all purposes. I am convinced that electricity, as a means of domestic heating, cannot in this country be a commercial success. Accordingly, I got into touch with the Ministry of Reconstruction, and at their request sent in a scheme. Subsequently, I drew up a pamphlet as enclosed.

The conditions with regard to the land settlement have in some measure changed; but the report in the "Journal of the Royal Agricultural Society," 1924, by C. Dampier Whitham, F.R.S., is not very encouraging. He states "no supply company could run a network of mains over a countryside to meet the rural demand, even when supplemented by that for agricultural power, especially since that power is chiefly used in winter with a very bad annual load factor." The article by Mr. Harald Nielsen in a recent issue of the "Journal," covers a large industrial area in which, for lighting and power, electricity will be a very keen competitor.

As you will see from my pamphlet, I am of the opinion that the first form of further development in the gas industry is the linking-up of small gas undertakings which are now inefficient. After my experience in America of running a combined gas and electric undertaking in which one had to deal with very high pressures, I came to the conclusion that the distribution of cheap power in Europe could be solved by dealing with the supply of gas on the lines of high-tension transmission of electricity. I designed apparatus for this purpose, and in 1913 mapped-out the whole of suitable places in England, and you were kind enough to publish an account of some of the apparatus in the "Journal" for Aug. 16, 1922. My opinion is that the first step in a forward movement is to increase the powers of the Gas Regulation Act, so that inefficient gas undertakings can be taken over by larger companies at a reasonable price, and in some districts supply electricity for lighting, obtaining the power from gas-engines.

E. A. Mitchell, M.Inst.E.E.,
Assoc.M.I.Mech.E.

The Grange, South Park, Reigate.

The pamphlet enclosed (which is dated 1918) deals with power, light, and heat in agricultural districts. In it Mr. Mitchell points out that the whole world has awakened to the importance of agriculture; and on all hands it is admitted that the physical degeneration of the people can only be averted by encouraging as large a population as possible on the land. This ideal, however, cannot be realized unless the conditions of rural life be largely altered. In some form cheap power is the essential factor for higher productions both in agriculture and in industries; and, in the absence of water power, the sources of supply are confined to oil fuels, electricity, and gas. As to oil fuels, the demand in the future is likely to be very large; and even if the supply be ample, its distribution would demand extra transport. Regarding the recommendations of the Committee on Coal Conservation, Mr. Mitchell says it is evident that the vast scheme of electrical power transmission which was proposed would take many years to mature; and therefore its relation to the immediate needs of agriculture is not clearly apparent. Mentioning that there are about 1650 gas installations in Great Britain as against 600 electricity undertakings, Mr. Mitchell proceeds: "Hitherto no proposal for the linking-up of gas plants on a large scale has been made, and indeed under the present conditions of manufacture and distribution no such development is possible. . . . There are, however, many hundreds of small plants scattered up and down the country which are inefficient; and here a scheme of centralization is applicable, for by linking-up many of these in groups, and by manufacturing only in those which are most favourably situated for obtaining cheap coal, immense economies could be effected, and valuable residuals, which are now lost, would be recovered. Such a development, to which the urgent needs of reconstruction point, demands a re-arrangement of the present system of distribution—viz., the transmission of gas under higher pressure than is now used in Europe, and over greater distances than are covered at present. Hitherto the need for long-distance gas distribution has not been acutely felt in this country, and therefore its possibilities have been little studied. The pressing needs of agriculture and of rural housing, however, make it highly desirable that the valuable services which gas can render if adapted to the new conditions should be immediately realized. The writer has carried out many power transmission schemes, electric and gas—the former in this country and on the Continent, and both electric and gas in Canada. The high-pressure gas system is largely used in the U.S.A. and in Canada, where the natural conditions have been favourable to its development. It is admirably suited to our present requirements; and it has the great advantage that it can be rapidly put into operation, is economical in capital outlay, and capable of a great expansion of supply without corresponding capital expenditure. . . . Moreover, in the enlarging of village or local industries, or the establishment of new ones, a combination of high-pressure gas supply and electricity would be perfectly feasible, and often advantageous."

Buying and Selling Coal and Coke on B.Th.U. Basis.

Sir,—The object of my letter in your issue of Feb. 24 on the above subject was to show:

1.—The advantages that would accrue by the adoption of a system whereby the figures in B.Th.U. put into the process of gas manufacture were shown, together with the B.Th.U. taken out of such process in the finished product gas, and in the bye-products.
2.—That the make of therms per ton of coal was mainly dependent on the B.Th.U. contained in the ton of coal purchased.
3.—The importance of buying coal and selling coke on the B.Th.U. basis, emphasizing particularly the fact that coke so sold eliminated the weight due to water.

These proposals do not appear to be criticized. I trust, therefore, they are to be adopted.

As an example of the present method of dealing with the analysis of accounts as usually published, I cited as an excellent result the case of a gas undertaking making 70 therms per ton of coal in ordinary horizontal practice, and pointed out that the calorific value of the coal was not given. Incidentally, I mentioned that the straight coal gas in this case was diluted with producer gas to some very small extent to regulate density. I should say that, before the reading of the paper by Mr. Gill, to which I referred, gas undertakings generally were satisfied with a make of (say) 60 therms per ton of coal purchased in the ordinary haphazard manner, without analysis.

I do not know when Mr. Gill first started to analyze coal, and reject coals with high ash and moisture content; but I inferred that the excellent result of 70 therms per ton was due more to this question of analysis than to anything else. In other words, the coal he used at the date of his paper contained more therms than previously, and by his process of inferior coal rejection his make per ton rose from about 60 to 70 therms. If I am wrong, perhaps Mr. Gill will put me right.

I thank Mr. Gill for making it clear that at the time of his paper no dilution process was in practice. Although a diluent is now used, I find that such is not producer gas; and I am in error here also. I was, I fancy, in the second case giving credit where it was not due—an offence I do not often commit. I apologize. I now know that in the South Metropolitan practice the straight coal gas is diluted with N_2 and CO_2. Why CO_2, however small the volume, I must leave for a chemist to explain.

In regard to the suggestion for correcting coal used to a dry ash-free basis, I would question whether on such a basis coals would not differ more widely than on an ordinary basis.

The practice of the South Metropolitan Company proves, I think, that the results of straight coal gas production are equal to those of any other system in general use. The inclination would appear to be to go still higher than 560 C.V. In this connection, I wonder if I might be told the reason for the necessity of (say) 60-in. pressure at the nipple of a high-pressure lighting burner in the case of rich gas, such as 560 B.Th.U., to obtain the maximum lighting efficiency, and why it is that, presumably, only 3 or 4 in. pressure at the nipple of (say) a gas fire burner produces the maximum heating efficiency. The answers to these queries would be an immense help to many in solving the problem of high-grade *v.* low-grade gas for distribution.

That the obtaining of 70 to 80 therms per ton of coal in a gas of 560 B.Th.U., with coke, *as things at present go* in the industry, is excellent work, no one will deny. If, however, 250 therms are obtainable, without coke, in just as serviceable a gas from the same ton of coal, what is to be said? May I be enlightened also on this?

George Helps.

Nuneaton,
March 8, 1926.

REGISTER OF PATENTS.

Coking Retort Ovens.—No. 227,087.

Koppers Company, of Pittsburgh (Assignees of Van Ackeren, of Pittsburgh).

No. 25,794; Oct. 29, 1924. Convention date, Jan. 4, 1924.

This invention relates to vertical retort apparatus for distilling or coking carbonaceous materials, of the type having separate vertical combustion flues in the heating walls. In these, owing to the length of the vertical flues, there is great difficulty in obtaining uniform heating at different levels; and it has been proposed to create fresh combustion intermediately in the vertical flues. The chief object of the present invention is to ensure rapid, intensive, and uniform heating of the retorts.

The invention consists broadly in that burners having separate fuel gas and preheated air supplies are provided for both upper and lower sections of each of the separate vertical flues extending continuously and side by side for the height of the heating wall; these supplies being organized for the maintenance of flow of burning gases through the upper and lower sections in series of each separate flue with fresh flame formation concurrently in both the sections.

The fuel gas supply may be either a rich gas—for example, the gas of distillation—or water gas, with regenerative preheating only of the air of combustion, or may be a lean gas such as producer gas, or blast furnace gas, with regenerative preheating of both gas and air. If desired, the apparatus may be equipped with both fuel supplies. To lengthen the flame where rich gas is employed, there may be means for admitting a gaseous diluent into the flame flues along with the air of combustion.

Another important feature of the invention consists in the series-flow flue sections in any heating wall communicating with like flues in an adjacent heating wall in such a manner that in any period between reversals some of the heating walls are traversed by flame, and the waste gases from the walls are discharged through the other heating walls into the "off" regenerators.

The invention is described in detail, and in connection with profuse drawings.

Automatic Control for Gas-Making Apparatus. No. 242,226.

HUMPHREYS & GLASGOW, LTD., of Victoria Street, S.W. 1.

No. 14,691; June 5, 1925. Convention date, Oct. 30, 1924.

Specification No. 238,519 describes an automatic interlocked electric controlling system for gas-making machinery in which an apparatus, whereby the master valves may be automatically operated while retaining the possibility of manual control of each and every valve at any time, is capable of acting as a unit. The present invention covers apparatus adapted to carry out the functions of an automatic valve controller, and adapted to form a unit in the general system set forth in that specification.

We cannot describe the apparatus in detail, but reproduce the patentees' general introduction, as follows:

Broadly, the apparatus comprises a number of main operating units such as valves and separate controllers such as hand lever operated members for the respective main units, intermittently driven means embodying cam-like devices adapted to actuate the controllers aforesaid, and mechanism such as shift gear adapted to determine the operation of the cam-like devices, the said shift gear being actuated by a motor which is employed to drive the cam-like devices, to drive a central mechanism for selectively operating electro-magnetic devices for governing individual elements of the shift gear, or to actuate all such means.

The apparatus possesses a number of advantages, prominent among which is that of being adapted to form a unitary mechanical whole with the central circuit controller of the application aforesaid. Other advantages are found in the fact that the valve hand levers are operated directly by a continuously operated motor, preferably electric. By virtue thereof the number of parts is reduced, and the simplicity of construction is greatly enhanced.

Gas Meters.—No. 246,417.

LORAM, E. R., of Walthamstow, E. 17.

No. 26,705; Oct. 24, 1925.

The object of this invention is to increase the capacity in relation to the size of the casing of a dry meter, and to improve and simplify the construction. A pair of movable partitions or diaphragms mounted in a common casing to form three working chambers are moved successively across the casing from positions in which the diaphragms are near together near one wall of the casing to positions in which they are near together near the opposite wall of the casing, so that the working chambers are successively expanded from a minimum volume to a maximum volume, which may be nearly equal to the total volume of the casing.

The diaphragms are connected to valve mechanism controlling the flow of gas into and out of the working chambers through the usual rods and levers, and the valve mechanism may be of any suitable known type. It is preferred, however, to provide each working chamber with one port which is connected alternately to the inlet and outlet pipes by means of a rotary valve.

LEGAL INTELLIGENCE.

COMPLETE GASIFICATION PLANT AT NEWTOWNARDS.

The Court of Appeal (London) have allowed an appeal by the Newtownards (Co. Down) Urban District Council from a judgment of Mr. Justice Rowlatt on a special case stated by the Umpire in an arbitration between the Council and Messrs. Perry & Co. (Bow), Ltd. [See "JOURNAL" for Dec. 9 last, p. 668.] Messrs. Perry & Co. agreed by contract to erect at Newtownards two Perry gas plants for £13,017. Complaints that the plants were not up to specification led to disputes, and arbitration followed.

Mr. SCHILLER, K.C. (for the Urban District Council), submitted that the Arbitrator had found that the plants were not suitable for the purpose for which they were supplied. The plants having, therefore, been rejected, the Council were entitled to repayment of £10,775, *plus* £1000 damages.

Sir MALCOLM MACNAGHTEN, K.C., argued that the contractors undertook no obligations as to the results if the plant were worked, as it had been, for the partial, as distinct from the complete, gasification of coal, and that Mr. Justice Rowlatt's decision in favour of the contractors was right.

The MASTER OF THE ROLLS, giving judgment, said that there was evidence that the Urban District Council relied on Perry's skill and judgment, and that the plant supplied was not reasonably fit for the purpose for which it was supplied. The Council were, therefore, entitled to reject the plant, and were entitled to payment of £10,775, which they had paid to the contractors, and to £1175 damages. The contractors would have an opportunity to take away such part of the plant as was removable.

The other Lords Justices concurred.

MISCELLANEOUS NEWS.

WANDSWORTH, WIMBLEDON, AND EPSOM GAS COMPANY.

Ordinary General Meeting.

The Ordinary General Meeting of the Company was held on Tuesday of last week, at the Cannon Street Hotel, E.C.—Mr. FRANK H. JONES (the Chairman) presiding.

The SECRETARY (Mr. C. W. Braine, F.C.I.S.) read the notice convening the meeting; and the report of the Directors and the statement of accounts for the year ended Dec. 31 were taken as read.

THE LATE CHAIRMAN.

The CHAIRMAN, in addressing the proprietors, said: Ladies and gentlemen,—In October, 1834, I find, from a document that exists in the archives of the Company, that a meeting was held of the inhabitants of Wandsworth and Putney to consider the expediency of establishing a gas-works. That was 91 years ago; and very shortly after that date a gas-works was established—the first Chairman of the Company (the old Wandsworth Company) being Mr. James Howell. He was succeeded by his son, Mr. Thomas Howell, as Chairman in 1860; and in 1904 Mr. Thomas Howell was succeeded by our late Chairman, who only laid down the reins of office very shortly after the general meeting last year, after 22 years' service in that capacity. I think the fact that this Company has had only three Chairmen in 91 years must be very nearly a record. Mr. H. E. Jones first became connected with the Company as Engineer, and retained that position from 1864 to 1869. It was in 1874 that he was appointed a Director, and, as I have already said, he became Chairman in 1904. Mr. H. E. Jones as an engineer rose, I may say, to the highest position in the engineering world, as President of the Institution of Civil Engineers. I think one may say that in the gas world he became, if I may so put it, its father and its leader. Many people in companies with which he was connected and with which he was not connected often came to consult him, because of his ripe experience. It is not, however, in reference to what he did outside, but to what he actually accomplished for this Company that I wish to say a few words. What the world thought of him the Daily and Technical Press at the time of his death will have told you, so I am only going to speak in regard to what we know of him in connection with this Company. Most of you present here to-day will recall the breezy and vigorous manner in which he was accustomed to conduct the meetings; but many of us knew him more intimately in his daily work for the Company. His work and devotion to the Company were immense; and I know that for the last twenty years "Wandsworth" was always first in his mind. He never put "Wandsworth" second to anything; and I think the present position of the Company amply reveals what time and devotion he must have given to it. His work has borne good seed. He was always out, as you know, for cheap gas and low capital in any part of London; and in respect to the price of gas I may claim that we are in the front rank. He was always mindful of those who helped him to attain these ends. He was always kindly and always nice to those who were "doing their job." Perhaps some may have thought he was a stern master; but he was always fair and considerate. He hated slackness and humbug; but I am quite sure that to all who did their best he was a great and generous friend. ["Hear, hear."] I think many in this room will fully agree in what I have said in regard to him whom we familiarly knew as "the old Chairman." What I have said of the late Mr. H. E. Jones I have said as your present Chairman; but it is none the less sincere and genuine because these words have been spoken by his former colleague, and, fortunately for me, by his son. We must now turn to the present and the future; but what I have said has been, I know, on behalf of you all. ["Hear, hear."]

KEEP YOUR GAS STOCKS.

The value of our stock in the market, like that of the stocks of nearly all other gas undertakings, has fallen lately in consequence

of the very large amount of electrical discharge there is in the air. I am not going to run down electricity, neither am I going to say much in regard to the Government proposals. I would, however, just mention that what the electrical world thinks of these electricity proposals—proposals, indeed, that are not definitely known to us yet—may be gathered from "The Times" of to-day, in which there is reported the general meeting of a big electrical power company in the Midlands. What the Chairman of that big generating and distributing company had to say about the Government proposals will, I think, give gas stockholders renewed confidence, and they will come to the conclusion that the proposed legislation, whatever may be its nature, is not going to be very terrible. Anyhow, I would say this one thing to you, and to other gas stockholders, I advise you not to sell your stocks in the Wandsworth Company, and, indeed, I advise you not to sell any of your gas stocks where the companies are properly and prudently managed. Certain people in the gas industry have been in consultation with different Departments on the matter. I find from the Board of Trade Returns that there are over 8,000,000 consumers in the country; and I venture to say that we who have the duty of carrying on the gas industry can fairly demand, very determinedly, that nothing shall be given to the electrical industry in the way of help from the Government which is not equally extended to us. ["Hear, hear."] I believe I am not going too far when I say you will find that the Government will not do anything to put the electrical industry into a position which will be unfair to the gas industry. I personally think that electricity and gas in the future will go hand in hand to a greater extent than in the past. I think that is inevitable. It is not a question of "gas *v.* electricity," but it is all a matter of "fuel;" and that the two industries will in the future come into closer co-operation in one form or another is, I think, certain.

BUSINESS EXPANSION.

We tell you in the report that there has been an increase in the sale of gas during the past year of 2·8 p.ct., equal to 419,000 therms, or 89,000,000 c.ft., which is just about the amount of gas that was being sold by the Epsom Company at the time of the amalgamation. It is a very substantial amount. Our gas as sent out from the three works of the Company has complied during the year with all the official tests. The dividends which we recommend are slightly more than those paid previous to the war, but not quite so high as last year, though they are as high as the present selling price, coupled with our standard price, permits us to pay. We think, and I expect you think, it is not quite fair. The London County Council and their advisers took the Company before the Board of Trade, who, in their wisdom, gave us a standard price which forced us to put down the dividend slightly; but I feel sure that you will support your Board when they have to go to Parliament, and ask that the dividends may be such as will enable us to raise further capital. We shall want more capital. Further capital will be necessary to meet the demands of our growing district, especially in the area that the tube extension from Clapham to Morden is opening-up. We shall have to spend a great deal of money; and it is imperative that this capital should be raised as cheaply as possible. ["Hear, hear."] If the Board ask your sanction to the raising of that further capital, I hope you will give it so as to enable us to go to the Board of Trade or possibly Parliament to get some relief in order that we may raise the capital as cheaply as possible. That is in your interest, in the interest of the gas consumer, and, indeed, in the interest of everybody. At present our dividends are not such as to enable us to raise the capital as easily and freely, and on such terms as we should like. I am sure you will give us your support when we come to you and ask for these further powers. Each 1 p.ct. in our dividends costs the consumers about one-tenth of a penny per therm, which is less than ½d. per 1000 c.ft. I cannot think that what we desire is too much to ask of Parliament, if it enables us to raise such capital as we require, which, when wisely spent, will permit us to meet the demands in our district, and to reduce the general price of gas. We have spent £50,000 of capital during the year, and of this £8000 has been spent in the purchase of land, the building of a new retort house at Epsom, and the erection of a considerable sized gasholder between Mitcham and Epsom. The rest of the capital spent has been devoted to mains, meters, and stoves. We are on very good terms with our consumers and the local authorities in our district. The Mayor, Aldermen, and Councillors of Wandsworth—the biggest borough in London— expressed a wish last autumn to see over our works. They came; and what surprised me was that gentlemen who actually lived in that district were astonished to see a ship of 1600 or 1700 tons lying-up almost in their streets. They expressed appreciation of what they saw; and I feel sure that the other local authorities likewise appreciate that we have done, and are trying to do, our best for them. We have sold one war-time ship, which was not built for passing under the bridges. It had been converted for our purposes; but we found it was rather uneconomical, and so it has been replaced by a more modern boat. We are going to sell another ship which is not running as cheaply as it should; and a further ship is now being built which I hope will prove as economical as our last new one. The Company now own 90 acres of land, which for an undertaking of this size and scope is a fairly big area—especially when one bears in mind that the bulk of it is right in the centre of London.

LOW PRICE OF GAS.

I do not propose to go in detail through our figures and working results. You have had them in your possession for a week. We have raised no new capital this year except £19,495 for profit-sharing needs. We were not able to buy on the market the stock we wanted, and so we have had to issue new capital, which we are entitled to do under our Acts. Coal and oil are down £19,000, and residuals are lower by no less a sum than £65,000. That is a large figure for a Company of our size. Receipts for gas are up £42,000, owing largely to the increase in price, but also, of course, to the larger quantity sold. When you come to the end of the revenue account you will find that after paying all our charges, debenture interest, income-tax, and so on, and also the money necessary to pay the dividends, that leaves us short in our earnings with which to pay the dividends to the extent of £2060. The Board are rather proud of this result. I myself went into the figures in July last, and was then perfectly convinced that we would have a deficit of at least £5000. In view of the low price of gas—8·4d. per therm in Wandsworth, and a corresponding low price in the other districts—the Board, as I have said, are very pleased that this deficit is not greater. I would point out that the Company have had an increase in the price of gas, in the way of help, for only nine months out of the twelve. During the current year we shall have the increased price over the whole twelve months; and we have coal contracts which will show a very considerable saving. Therefore we have every hope that the price of gas in Wandsworth will not have to go up.

APPRECIATION OF SERVICES.

We are very much indebted to all those who are in our service; and when I say that, I am speaking as a shareholder. We are indebted greatly to everybody, right down to the humblest person working for the Company. I have seen in very great detail lately what they do; and everyone is "pulling his weight." Unless everyone pulls his weight in a boat, it is not properly balanced; but our boat is running on a very even keel. What is the reason for this? I think the reason is that we have 1200 or 1300 profit-sharers all looking after their and our interests, and doing it extremely well. They hold now over £60,000 of the stock of the Company; and it will shortly be nearly £80,000, with this year's bonus. It is not only because they have this money that they work so well. They are a most happy, contented lot of men; I know of no company who have a better set of employees. I have had a fair amount of experience of working under co-partnership or profit sharing; and when I read the papers nowadays I often think to myself what a tragedy it is that more businesses will not adopt the principle. Many people have discussed it with me, and too frequently the comment has been: "It is easy for the gas industry, but it will be impossible for us." That is all nonsense. There are people who can show them how it can be done; but they will not listen. What is required is that people shall get together, and determine that the principle shall be carried into other industries, in order to put an end to the strife and upheavals that we now see all about us. We also have a staff with whom it is a real pleasure to work. Before I close, I should like to mention the names of four gentlemen whose kindness and help have been of great assistance to me in my new position of Chairman, and therefore to our Company. They are the Deputy-Chairman, Mr. Garraway Rice, Dr. T. A. Ives Howell, Mr. C. W. Braine (the Secretary), and Mr. C. M. Croft (the Engineer). I mention them because I come in contact with them rather more than with others, and because they are typical of the way in which everybody takes part in our business. It would be impossible without mutual confidence to manage a big undertaking as this one is managed. We are specially happy in this respect. I am in a new position, but it has been to me a very interesting one. I have had the greatest kindness from everyone in the Company, and I want to thank everybody for what they have done. I will conclude by moving:

> "That the report and accounts for the year ended Dec. 31, 1925, be confirmed and adopted."

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice) formally seconded the resolution.

Mr. E. L. BURTON said he thought everybody in that room must, having regard to all the circumstances of the past difficult year, commend the Directors for the manner in which they had managed the business. Everybody who knew their new Chairman would agree that a more suitable and fitting Chairman for this Company could not have been found, had the country been searched through. ["Hear, hear."] It had been his (the speaker's) great delight to be associated for many years past with Mr. Frank Jones in other concerns; and he had always proved himself to be most highly equipped technically and an extremely capable administrator. He was kindness and generosity itself to those who worked under him, and was one of the most genial and courteous colleagues one could have. All would heartily congratulate him on becoming Chairman of this Company, and would congratulate his colleagues on the Board upon the great help he would bring to their counsels, and the proprietors and consumers upon the able manner in which he would administer the affairs of the Company.

Mr. F. G. PILLEY said he was sure all present would like to mark their respect for the memory of the late Chairman; and on his suggestion this was done by those present standing silently in their places.

Mr. HENNELL said he had been particularly interested in the Chairman's references to co-partnership, and his desire that the principle should be more freely adopted throughout the country. For a long time past he himself had felt that this would be a solution of many difficulties. As to the street lighting of Wandsworth, he would like to see this improved; but probably this matter was not under the Company's control.

The CHAIRMAN replied that the whole of the street lamps in Wandsworth were lighted by gas, and on a scale which was decided by the Borough Council. They stated just what they wanted; and the two Companies concerned—the South Metropolitan and themselves—had to tender for the lighting. They could do nothing but carry out the work set them. He thanked those present for the respect shown to his father's memory and for the kind things that had been said about himself.

The report and accounts were then unanimously adopted.

DIVIDENDS AND RE-ELECTIONS.

The CHAIRMAN proposed the payment of dividends for the half-year to Dec. 31 last at the rates per annum of 5 p.ct. on the preference stock, 8½ p.ct. on the Wandsworth "A" stock, 7 p.ct. on the Wandsworth "B" stock, £5 19s. on the Wandsworth "C" stock,

£6 12s. 6d. on the Wimbledon stock, £7 2s. 6d. on the Epsom stock, and £5 19s. on the new ordinary stock. He said that next time the Company went to Parliament they would try to formulate a scheme whereby this large number of different stocks would be reduced. ["Hear, hear."]

Dr. T. A. IVES HOWELL seconded the resolution, which was agreed to.

The CHAIRMAN proposed the re-election as Directors of Messrs. R. M. Chart and B. R. Green. Both he said were valuable members of the Board; and he hoped the proprietors would re-elect them.

The DEPUTY-CHAIRMAN seconded the proposition, which was unanimously passed.

Proposed by Mr. CHARLES WEBB, and seconded by Mr. A. M. PADDON, the retiring Auditor (Mr. E. L. Burton) was also re-appointed.

THANKS.

Mr. POTTER proposed that the hearty thanks of the meeting be accorded to the Chairman and Directors, the Secretary, the Engineer, and the whole of the staff and workmen of the Company, for their services during the past year. They had, he said, unfortunately lost their old Chairman, but they had got a new Chairman who, he was quite sure, would maintain the old traditions of the Company.

Mr. WEBB seconded the vote of thanks, which was cordially passed.

The CHAIRMAN having briefly acknowledged the compliment on behalf of the Board,

Mr. BRAINE returned thanks on behalf of himself and his staff. He remarked that all had the interests of the Company at heart; they had been brought up by their old Chairman to regard this as their duty.

Mr. C. M. CROFT (the Engineer), speaking for the officers and employees on the works, also returned thanks, and promised that all those who had worked so hard in the past year should hear of the appreciation of those for whom they worked. The present Chairman had already done much for the welfare of the workers of the Company, who knew him intimately before he took up his new position; and they were all determined to support him as loyally in the future as they had done the late Chairman in the past.

Mr. BURTON said that, having regard to the great services rendered to the Company by Mr. H. E. Jones, and the immense debt of gratitude the proprietors owed him, he felt sure those present would desire that a record should be put upon the minutes of their great sorrow at his death, and their recognition of all that he did for the Company during a strenuous life. ["Hear, hear."]

The CHAIRMAN said that at the works there was a building put up many years ago which had been lying more or less idle; and this had been named the "H. E. Jones Institute," and fitted up with tables for billiards and facilities for concerts, &c. This had contributed largely to the enjoyment of the men.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

A Year of Great Activity.

The Ordinary General Meeting was held at 5, Great Winchester Street, Old Broad Street, E.C., last Friday—Mr. A. M. PADDON (Chairman) presiding.

The CHAIRMAN, proposing the adoption of the report and accounts for the year ended Dec. 31, said that the period had been one of great activity for the undertaking, technically, financially, and commercially; and its progress had left its mark upon almost every feature of the accounts. The total capital receipts were £932,551, of which there was the satisfactory corollary that it represented only £440 per million c.ft. of gas sold. This figure was satisfactory. During the year the Company had spent on capital account some £52,075, and had reduced this by deductions for depreciation by £9097, making the net capital expenditure £42,977. Business had been increased to the extent of 97 million c.ft. of gas, so that the ratio between the capital raised and the business done had been somewhat improved. The essential figures on the revenue account were that from the total rentals the Company received an increased amount of £20,945, which they immediately proceeded to lose in connection with residuals, to the extent of £12,893. The increased total receipts were £7613. The expenditure on coal, oil, and coke showed a decrease of over £4000, which, considering the increased output of gas of nearly 5 p.ct., was very satisfactory. An even more satisfactory figure was that with regard to carbonizing wages; gross wages having fallen by £1187. The cost of carbonizing per 1000 c.ft. of gas produced was just over 3d. This satisfactory result was, indeed, expected, by reason of the dispositions made at Portslade. Great efforts were being made towards increased efficiency; and he did not despair of seeing the Portslade technical figures in the forefront of similar figures throughout the country. Total maintenance charges did not fall short of 18d. per 1000 c.ft. of gas; and even the most searching critic of accounts would concede, when this fact was disclosed, that there could not be very much wrong. Rates and taxes had increased by £1500. A sum of £6381 had been carried to the special purposes fund. The Company had not raised the price of gas, in spite of the heavy loss on residuals. It remained at the comparatively low figure of 9½d. per therm in the central area; and the outside districts were favourably treated in comparison with the usual differential charge exacted in similar circumstances. The sum total of the matter was that, whereas the receipts were increased by £7613, the expenditure had risen by £8022, which meant that £409 had to come off the profit. But this profit was a very ample one. As to the future, there was a handsome balance to the credit of the Company in the output of gas up to date for the current year; and he saw no reason why it should not continue. A good many of the local shareholders, and those who were closer to the financial centres of operation, had been disturbed in their minds, and their confidence had been to a certain extent affected, by the Government's electricity proposals. This could not be ignored when one considered its effects on gas investors' interests. He did not think it had caused very many to sell their shares or stock; but it had made it increasingly difficult to put fresh capital out, which capital was demanded by the normal expansion of the gas industry to-day. So that a disability had already been incurred by reason of the Government's proposals. Perhaps the most pertinent comment on the proposals came from a responsible man connected with the industry which the Government apparently desired to benefit, and the proposals did not seem to be received with the enthusiasm that one would expect from those who were to acquire the prospective advantages which presented themselves to the Government. Mr. George Balfour, M.P. (Chairman of the Midland Counties Electric Supply Company, and one of the most responsible and influential gentlemen connected with the distribution of electricity on a large scale), referring to what he had termed the loose talk in Government and public circles as to a cheap and abundant supply, had said:

> Why do these wonder-workers whisper in our ear the great cure? Is it to be a cure-all pill, with State control as the chief ingredient, or is it to be founded on private enterprise, with freedom and push, to develop unfettered with the same scope as is allowed in America? We hear a great deal about linking-up stations and standardizing periodicity, and are told, with what degree of truth I cannot say, that these operations will be the means of providing the cheap and abundant supply which the Acts of 1919-22 have apparently failed to produce. The abundance and the cheapness will be forthcoming if the industry is left alone and legislation confined to the protection of the public interest, founded upon a principle of policy applicable to any or all interests, businesses, or operations legally carried on by the people of this country. When you remember we were only able to start active developments three or four years ago, and have, during the last three years, laid 207 miles of high-tension lines, of which no less than 110 miles were laid last year, you might imagine that our average price per unit would be high. You will be surprised to hear that, calculated in units sent out of the power stations, we received an average rate in Derbyshire and Nottinghamshire of 0·885d. per unit, and over the four counties including Leicestershire and Warwickshire an average of about 1d.

Could any Governmental action that could be conceived improve upon such results as those, coming from men whose whole interest and technical training was devoted to developing on the most improved lines? The Brighton Gas Company were not biased or narrow-minded, because on their works they produced enough electric current to supply twice over the requirements of the town of Hove, and used it in the manufacture of gas. They could produce it at under 1d. per unit. He did not think the gas industry need fear anything the Government would do, except that it would disquiet public opinion and temporarily depreciate gas investments; but ultimately it would hinder rather than help the electrical industry.

Mr. G. W. CAREY (Deputy-Chairman) seconded the adoption of the report and accounts, which was agreed to.

Dividends were declared making 12 p.ct. for the year on the "original" ordinary consolidated stock and 9 p.ct. on the "A" ordinary consolidated stock, both less income-tax; the retiring Directors (Mr. A. M. Paddon and Sir Charles L. Morgan) were re-elected; and Mr. William Cash, F.C.A., was re-appointed Auditor, and was also elected Special Auditor to audit the accounts for 1925 in conjunction with the Auditor appointed by the Brighton Corporation.

Mr. FRANK JONES, proposing a vote of thanks to the officers and staff, said that at the Portslade Works of the Company there were three retort houses designed by Mr. A. M. Paddon's father (Mr. J. B. Paddon) and erected under the supervision of Mr. Joseph Cash. Those retort houses, without the slightest alteration, were now fitted with the most modern plant, and were probably the most efficient retort houses of any that he knew. That said a great deal for Mr. J. B. Paddon and Mr. Cash, as well as for the staff. He paid a tribute to the efficiency of the staff, and coupled with the vote of thanks the names of Mr. E. L. Burton (Secretary) and Mr. C. H. Rutter (Engineer and General Manager).

Mr. J. M. MILES seconded the vote, which was carried with acclamation.

Both Mr. BURTON and Mr. RUTTER responded, and paid a tribute to the work of Mr. J. B. Paddon.

A vote of thanks was also accorded the Chairman and Directors for the able manner in which they had managed the affairs of the Company.

The question of gas *versus* electricity for street lighting purposes was discussed at a recent meeting of the Llandudno Urban Council. The Electricity Committee submitted a proposal to erect four additional lamps at a cost of something over £200. Mr. R. C. Baxter, who is Chairman of the Gas Committee, protested against the expense, saying that gas lamp standards of the most improved pattern, which would give equally satisfactory lighting, could be erected at one-third the cost.

NORTH MIDDLESEX GAS COMPANY.

Sales of Gas Up 9½ P.Ct.

The Ordinary General Meeting of the Company was held on Monday, March 1, at 5, Great Winchester Street, E.C.—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting, and the report and accounts for the year ended Dec. 31 were taken as read.

The CHAIRMAN, on rising to move the adoption of the report and accounts, referred to the loss which the Company had sustained since the last meeting by the death of Mr. S. A. Sampson, who had been a Director for nearly thirty years. He was a thoroughly sound lawyer, and was always ready to give the Company the benefit of his great knowledge; and he took the keenest interest in everything pertaining to the Company—more particularly in regard to co-partnership, as to the success of which he was always firmly convinced. Turning to the business of the Company, the Chairman remarked that an application had been lodged with the Board of Trade for a Special Order to deal with their various requirements; and the accounts showed how urgent at least one of these requirements was. The capital accounts revealed that they had no further stock which could be issued; while there only remained to be borrowed £9300. On the other hand, they were overspent on capital account to the extent of £9853. This was the main reason which had prompted them to apply for an Order which would give them the necessary further capital powers to enable them to carry on their rapidly extending business. They had spent during the year under review £18,503, and had written-off from this £1845; so that the net amount expended on capital account was £16,658. This was at the rate of about £333 for each million c.ft. of new business that had been acquired, which was a satisfactory figure. The increase in gas sales for the year had been 9½ p.ct.; but this mainly accrued in the final two months of the year, and did not represent a steady increase of 10 p.ct. in the demand. On certain days the demand showed an increase of nearly 50 p.ct., and this not during the least important period of the year, but at the peak of the Company's production. The total receipts on capital account amounted to £291,541, and adding to this the £30,000 on loan from the bankers they arrived at a figure of £561 per million c.ft. This was a reassuring, but not gratifying, figure; and they had reasonable expectations of reducing it considerably. On the credit side of the revenue account, the receipts from gas, rental, and fittings were £16,900 more; and a falling-off of nearly £4000 in the receipts from residuals left the total receipts £13,154 up. On the other side, the expenses were £12,497 more, so that the profit was improved by £657. A sum of £2436 more had been spent on repair, maintenance, and renewal of works and plant. The total sum represented about 9½d. per 1000 c.ft.; and the whole extent of the outlay under these heads on works, plant, distribution, &c., came to just under 1s. 6d. per 1000 c.ft. This would show that the proprietors were justly entitled to any profit that accrued at the end of these accounts. The balance carried to profit and loss account was £19,591, and £5193 was brought in. There would be carried forward £4227, which was a reduction of £966; but as the reserve fund was benefiting to the extent of more than £1500, they were really some hundreds of pounds to the good over and above interest and dividend charges. The Directors had appointed Mr. G. W. Carey to fill the vacancy on the Board, and felt that, in view of his special knowledge, they were to be congratulated upon having obtained his services. The increase in the Company's business during the current year up to date had been larger than that recorded in the report; and it appeared as though this progress would be maintained, because building operations in the district were very active indeed. The efficiency of the works had been definitely advanced during the past year. As to the Government Electricity Bill, in their particular case they had to deal with electricity supplied by local authorities in the ordinary way; and he did not think anything the Government were likely to do would make these local authorities any more active or more efficient, while he was perfectly certain that nothing which had been indicated in the way of policy would make it cheaper. Over-centralization had been responsible for a great deal of loss. Up to a certain point, centralization was advantageous; but beyond that it was an utter fallacy. While the proprietors had no need to be apprehensive, he did think it was a most lamentable thing that the Government should use for vote-catching purposes a particular industry, without any regard to possible detriment to other industries.

Mr. H. A. LERMITTE seconded the motion for the adoption of the report and accounts, and it was unanimously agreed to.

Dividends were declared making in the cases of the original ordinary stock and the additional ordinary stock a distribution for the year of 11½ p.ct. and £8 1s. p.ct. respectively, less income-tax; and the sum of £1512 was carried to the reserve fund.

Messrs. H. A. Lermitte and G. W. Carey were re-elected Directors; and the Auditor (Mr. Lewis Hardy, F.C.A.) was also re-appointed.

On the proposition of the CHAIRMAN, a hearty vote of thanks was passed to the Secretary, the Engineer and Manager (Mr. Lawrie Trewby), their staffs, and the co-partners generally.

The vote was acknowledged by Mr. BURTON, Mr. TREWBY, and Mr. J. R. GALE—the last-named on behalf of the Co-Partnership Committee.

The proceedings concluded with a vote of thanks to the Chairman and Directors, which was moved by Mr. C. H. RUTTER.

GAS COMPANIES' RESULTS IN 1925.

Increases on All Sides.

Altrincham.

At the annual meeting of the Company, the Chairman (Mr. Thomas Fairhurst), in presenting the report, said the year 1925 had been, in some ways, rather a difficult one, but the general results were fairly satisfactory. There had been an increase of about 15 million c.ft. in the sales of gas; the total for the year being 322 millions. An increase in revenue from gas was counterbalanced, to some extent, by the continued slump in prices of residual products; coke and ammoniacal liquor having suffered most, while tar showed a slight improvement. The balance available for dividend was £6070, which would provide for payment of the full statutory dividends, and leave a balance of £2813 to be carried forward.

Cheltenham.

Mr. C. L. Grundy, presiding at the annual meeting of the Cheltenham Gas Light and Coke Company, said the accounts gave evidence of a successful and progressive year's business activity. Receipts from the sale of gas showed an increase of nearly £3000, although the price was lower than in 1924. In the matter of residuals they had suffered, as had similar undertakings, but no more in proportion. Coke was a residual, the output of which increased correspondingly with the output of gas, and for which it was difficult to find an increasing market. On the expenditure side £3000 had been saved under the heading of coal; and there was a reduction of over £5000 in expenditure on extraordinary repairs and renewals. The contingency fund, started last year, now stood at £10,000; but they had before them the prospect of heavy expenditure next year. The output last year was 504 million c.ft., a record for the Company, and representing an increase of 15 p.ct. in the last two years; while the consumption of coal was 600 tons less than in the previous year. With regard to the Government electrical scheme, the Chairman said that, as far as could be seen at present, there did not seem to be anything which need cause serious alarm to shareholders in gas undertakings. The Company had been able, not only to avoid increasing the price of gas, but to announce a small reduction. A dividend of 5 p.ct. per annum on the consolidated ordinary stock was declared.

Chester.

In proposing the adoption of the report and balance-sheet at the annual meeting of the Company, Sir J. M. Frost (Chairman) said that the sales of gas yielded an increased return of £4800, for the most part due to an increase of 4·3 p.ct. in the quantity sold. The rental from prepayment meters and fittings was also substantially increased by £360. Residuals, however, had yielded considerably less revenue. The total revenue was practically the same as last year—£93,825, against £93,797. The aggregate saving in expenditure was roughly £3000, leaving a balance of £14,000 to carry to profit and loss account. This sum represented the amount required to meet the payment of interest on debentures and dividend on capital. Turning to the net revenue account, they would see that, after payment of interest on the debenture and preference stocks for the year, and the payment of an interim dividend at 2½ p.ct. on the ordinary stock last August, there was a balance, subject to dividend on ordinary stock, of £13,203. The dividend now recommended was the balance of the original rate of 5 p.ct. per annum—*i.e.*, 2½ p.ct.—with an additional ¾ p.ct. in respect of the price of gas having been below the basic rate. For this purpose they took a sum equal to the amount allocated to the co-partnership fund—£1402—and deducted therefrom the amount required for the extra ¾ p.ct. dividend. This left £223 to transfer to reserve fund account. After payment of these dividends, the carry-forward would amount to £7872. It was satisfactory to note that during the past year £1090 of stock had been purchased by the employees under the co-partnership scheme, bringing up the aggregate holding to £3130, in addition to £2040 held by the trustees for the scheme. The following dividends were declared: On the preference stock, 4 p.ct. per annum; on the ordinary stock, as mentioned above.

Cork.

Presiding at the ordinary general meeting of the Company, Mr. Wm. B. Harrington, the Chairman, moved the adoption of the report and statement of accounts as submitted by Mr. R. Henry, the Secretary. The returns showed a satisfactory increase in gas sales, due to the extended use of gas for heating and cooking purposes. Receipts from residuals were low, owing to the reduction in prices obtained for coke. After placing £1000 to credit of depreciation fund, the balance of profit and loss was £4678, and the dividend was the usual 8 p.ct. per annum. In the opinion of the Chairman the report and figures were satisfactory. The increase in consumption of gas amounted to 4 million c.ft. on the corresponding period of the previous year. The drop in the figures for residuals was offset by saving in the handling of coal and better working results. They had fitted 414 gas stoves and appliances during the past half-year, making the total number now in use 20,991. Their competitions in relation to the gas stoves had been such a success that they hoped to have another one, and also a competition in ordinary cooking for

schoolgirls. The motion for adoption was agreed to, and the dividend at the rate stated was declared.

Derby.

The annual meeting of the Derby Gas Light and Coke Company was held on Feb. 26—Mr. William Woolley (Chairman) presiding. The Chairman said it was of interest to note that cooking stoves, fires, water heaters, and various kinds of gas appliances in use now numbered 42,678—an increase of 2820 during the year, which denoted the growing popularity of gas for domestic and trade purposes. This was reflected in the increase in the sale of gas, which for the year under review was in round figures 1165 million c.ft. The total receipts for the sale of gas during the year were £230,120, being £9725 more than last year, due entirely to the increased quantity sold. The rentals of meters, stoves, and fittings totalled £31,026 —an increase of £807. Like all other gas companies, they had not done so well with residual products; and these, after deducting the cost of manufacture, carriage, &c., amounted to £95,001, which was a decrease of £11,540. In many towns the loss of revenue from bye-products had been so serious as to necessitate an advance in the price of gas. They had not, however, found it necessary to take this course; and the charges still remained among the lowest in the country. The average price last year was slightly over 2s. 10d. per 1000 c.ft. The total receipts for the year amounted to £358,005, compared with £359,012, being a decrease of £1007. They had completed the reconstruction of the vertical retorts at the Cavendish Street Works, and also replaced the sulphate of ammonia plant at the Litchurch Works. The gross profit for the year was £62,448, being a decrease of £2696, which he ventured to think they would all consider satisfactory. The Chairman then referred to the approaching resignation of their Secretary, Mr. Herbert Bullivant, who had been in the service of the Company for the long period of 53 years, and for a quarter of a century had occupied the position of Secretary. They had been fortunate in finding a successor in the person of Mr. Lindsay Stroyan. The Chairman concluded by moving that a dividend on the consolidated stock be paid at the rate of 4½ p.ct. for the half-year ending Dec. 31 last, less income-tax. Mr. W. Hart, J.P., seconded this.

Dover.

The Directors report an increase of 12½ p.ct. in the gas sales. The accounts for the past year show a gross profit of £11,685, out of which £1000 has been carried to the reserve fund; and a final dividend is recommended of 3½ p.ct., less income-tax (making 7½ p.ct. for the year), together with a further 1 p.ct. on account of back dividends. To meet the cost of the necessary outlay caused by the expansion of the Company's business, the Directors have decided to issue by tender £5000 of new ordinary stock.

Eastbourne.

The revenue account shows a profit of £18,410 for the year. The Directors recommend the payment of the following dividends for the second half of the year: On the "A" stock, £8 5s. p.ct.; on the "B" stock, £6 15s. p.ct.; and on the 5 p.ct. preference stock, 5 p.ct. per annum. These dividends will absorb £9442, leaving a balance of £12,358 to be carried forward. There has been an increase of 3·84 p.ct. in the sales of gas.

Exeter.

Striking figures showing the continuous and steady expansion of the Exeter Gas Light and Coke Company during the past twenty years were given by Mr. G. Hardy Harris, Chairman of Directors, at the annual meeting. In that period the consumption of gas has increased by 120 p.ct., and the number of consumers by 78·6 p.ct., while the figures relating to hire of appliances show an increase of 175 p.ct. This huge increase had been coincident with the development of electricity. The revenue account showed a profit for the past year of £12,836, compared with £12,225 for the previous year; and the sale of gas had increased by 35¾ million c.ft. The report was adopted, and dividends were declared of 10 p.ct. per annum on the original stock and 7 p.ct. on the new ordinary shares, both less income-tax. It was stated that the Directors had under consideration the question of extending the gas supply to Topsham.

Gloucester.

At the annual meeting of the Gloucester Gas Light Company, the Chairman (Mr. J. H. Jones) said that the year's working showed a gross profit of only £6339, as compared with £12,403 last year. This was due to a reduction in the price of gas, which was now 3s. 3d. per 1000 c.ft. On the year's working a loss of £3300 was shown, but they would still have a balance in hand of some £11,000 after paying the present dividend. It was a great satisfaction to the Directors to have entered into a new lighting contract with the Corporation of Gloucester. In all respects the business of the Company had been going on satisfactorily. The total year's increase in the consumption of gas amounted to over 12 million c.ft., or 2½ p.ct.; and this followed on other large increases. To show the steady progress of the Company, the total consumption for the year ended Dec. 31, 1905, was 309 millions; for the year ended Dec., 1915, 393 millions; and for 1925 518 millions, or an increase in the first ten years of 27 p.ct., and for the last ten years 31 p.ct. The capital account was overdrawn by £12,550, and this would be met by calling-up the balance of the share capital; and they hoped to be in a position to offer this for disposal shortly. They were also recognizing that soon they would have to go to Parliament for increased powers. On the motion of the Chairman, seconded by the Deputy Chairman, a dividend at the rate of 5 p.ct. per annum, less income-tax, was declared upon the consolidated stock of the Company for the half-year ended Dec. 31 last.

Hastings.

A scheme of co-partnership and pensions for employees of the Hastings and St. Leonards Gas Company was considered at the half-yearly meeting, when Mr. W. J. Glenister (Chairman) presided. In moving the adoption of the Directors' report for the half-year ended Dec. 31 last, he said that on the capital account there was an increase in expenditure of £3645, due to the work carried out by the Company in connection with the Battle Company, which had been purchased. In new buildings there was an increase of £4000, and that was due practically entirely to the purchase of the Battle Company. New mains and service pipes showed an increase of £1341, and there were also small increases in respect of new meters and stoves, making £4906. The whole of the capital account showed an increase of £4470. The revenue account was of great interest. In the item for coal, oils, coke, &c., there was a decrease of £41, but he would point out that the sale of gas had increased by over 20 million c.ft. Private lighting had increased by practically £5000, and public lighting had decreased by £230—making a net increase of £4736. As to residual products, in common with all gas companies they had suffered from a slump in the sales of coke, tar, and ammoniacal liquor. Coming to the profit and loss account, the balance brought forward amounted to £14,000, an increase of £1435. On the general balance-sheet the balance was £7400 less than in the corresponding half-year. There had been a highly satisfactory increase in the business of the Company. The Chairman explained in detail the schemes of co-partnership and pensions for employees. The pensions scheme is a voluntary contributory scheme whereby pensions are payable to men upon reaching a certain age. The scheme is estimated to cost the Company £1000 per year. Resolutions approving of both schemes were passed.

Northwich.

The annual meeting was held on Feb. 22. Mr. C. T. Eachus (Chairman), in moving the adoption of the report and balance-sheet, stated that the year's working had proved highly satisfactory. The revenue account showed a profit of £5802; and after paying the interim dividend and interest on loans, &c., there was, with the addition of the amount brought forward from last year, a disposable balance of £5241. He drew attention to the increase in sales of gas. The demand for gas in their district was excellent; and it would be necessary to instal new plant and mains to cope with the extra demands in the near future. Mr. W. J. Yarwood (Deputy Chairman) supported the Chairman's remarks. Dividends of 4 p.ct. on the preference shares (free of tax) and 7 p.ct. on the ordinary stock (less income-tax) were declared for the past half-year, making, with the interim dividends, 4 p.ct. and 6 p.ct. respectively for the whole year. There was transferred to contingency account the sum of £500, and to new purifiers account £1000, leaving a balance of £1828 to be carried forward to next year.

Oxford.

The annual meeting of the Oxford Gaslight and Coke Company took place on March 1, when Alderman F. W. Ansell, J.P., the Chairman of the Company, presided. He said that they had an increased revenue from sales of gas of £14,000, in excess of double that for the half-year ended Dec. 31, 1924. This was due, of course, to the increased sale of gas. The market for residual products—especially tar—had been in a depressed state during the year; the yield from tar for the year being little more than the yield for the previous half-year. Mr. J. Ferguson Bell remarked that the Company had done exceedingly well on the whole. They had obtained from the sale of residuals about 62 p.ct. of the cost of the coal. The Chairman then moved that a dividend be paid on the preference stock for the half-year ended Dec. 31, 1925, at the rate of 5 p.ct. per annum; also a dividend on the consolidated ordinary stock at the rate of 10 p.ct. per annum. Mr. W. E. Caton, General Manager and Engineer, stated that the sale of gas for 1925 exceeded that of 1924 by over 56 million c.ft., or 8·7 p.ct. This sale in 1925 exceeded that of 1918 by 330 millions, or 86 p.ct., which was then a record to that date. During the year, 587 new consumers had been gained, and 63 additional public lamps had been connected, as compared with 8 during 1924. The number of public lamps now in use was 1605. The number of cookers and fires on hire and sold outright had increased by 1971, and water heaters by 95. Prior to this winter the maximum daily output was 2,896,000 c.ft.; this winter, however, the maximum was exceeded on no fewer than 39 days. The maximum daily output reached 3,359,000 c.ft. The safe working load for the present works was only 3 millions per day average over a week, whereas they averaged over two separate weeks 3,100,000 c.ft. per day. From these figures they would see the absolute necessity for the new section of works which they hoped to have ready for gas-making soon after midsummer, for next winter's demand.

Reading.

The annual meeting of the Company was held on February 23. Mr. G. W. Webb, J.P., who presided, said that the increase in the quantity of gas sold constituted a record in the Company's history. The income from this source was up by over £17,000. This increased income was partly due to the increases in price from Lady-Day. The revenue from residual products unfortunately showed a considerable falling-off during the year; and the income from this source is down by £10,668. Owing to this fall in prices of residuals they had been compelled to raise the price of gas from Lady-Day last by six-tenths of a penny per therm, which made the standard price in Reading 8·4d. per therm, or 3s. 2½d. per 1000 c.ft. Even with this increase, the price was less by 1s. per 1000 c.ft. than it was four years ago. The other chief source of revenue—rental and sale of apparatus—showed a very satisfactory increase, and illustrated the continued and growing appreciation of the convenience of gas appliances. No fewer than 2000 additional cookers and fires had been fixed during the year, irrespective of those purchased outright by customers. Practically all the expenditure on capital account had been in the district—new mains, additional cookers and fires. Extensive renewals had been carried out to the vertical retort installation. The amount charged against the renewal fund was £5229. All this was in respect of this installation. To provide for the great and continuing increase in the business, considerable extensions would have to be made to plant in the near future; and the question was receiving the consideration of the Directors and the Engineer and Manager, Mr. D. H. Helps. Since 1921 the increase in gas sales in Reading

was over 200 million c.ft. Regarding the present year, he was pleased to say they had made their new coal contracts, dating from July 1, at some reduction in price. They had obtained the contracts for lighting the public lamps in the Borough of Reading—excluding the Caversham area—for a period of seven years; and the Corporation of Reading had decided to adopt automatic lighting. During the year there would be two events of considerable local interest—the opening of the new Caversham Bridge, and the Royal Agricultural Show. They had already carried mains over the bridge, but a considerable amount of main-laying was involved in connection with the Royal Agricultural Show, where a very large amount of gas would be required for catering and other purposes. An order had been received from the catering contractors to the show for a large installation of gas cooking appliances. The Deputy Chairman (Mr. T. E. Hewett), in seconding the motion, said that the growth in their business had been a healthy and continuous one, due purely to the merits of gas and the recognition by the public of its uses. In regard to the increase in revenue, this was especially remarkable in the amount obtained from the hiring of gas apparatus. In 1890, when this was commenced, the income from this source was £13. Last year it was nearly £23,000. Mr. D. H. Helps remarked that in Reading the consumption of gas doubled every eighteen years. An extraordinary general meeting was afterwards held, at which the Directors were authorized to raise the balance of the capital of the Company, and to dispose of the Company's land at Pangbourne.

Southgate.

The sale of gas for the year shows an increase of 5·61 p.ct. compared with that of the preceding year. The Directors recommend the declaration of dividends for the half-year ended Dec. 31 last as follows: On the preference capital, 5 p.ct.; on the original capital, 10 p.ct.; and on the additional capital, 7 p.ct. per annum, all less income-tax. This will leave £4565 to be carried forward.

Sutton.

Satisfactory results during 1925 were reported at the annual meeting on Feb. 18. Alderman E. J. Holland, D.L., J.P., Chairman, said that in the revenue account was an increase of £4310 from sales of gas, due in large measure to an increase in consumption of 4·9 p.ct. There was also an increase of £490 in the rentals from meters, stoves, &c. The receipts from residuals, however, show a decline of £5850 compared with 1924. The net decrease in revenue was about £1050. On the other hand, expenditure was somewhat less. After making provision for depreciation, and carrying the usual sums to insurance and renewal funds, the balance on the year's working was £14,748, sufficient to cover the debenture interest and the dividends, with a margin of £2250. During the year they had gained 614 new consumers. Showroom sales had increased by 11 p.ct. Over 1091 fires and 750 cooking stoves had been fixed, besides 375 other pieces of apparatus. A final dividend of 4 p.ct., making £7 15s. p.ct. (less income-tax) for the year, was declared, on the motion of Mr. J. Ferguson Bell, seconded by Mr. A. Stevens.

Uxbridge.

Speaking at the annual meeting of the Uxbridge, Maidenhead, Wycombe, and District Gas Company, the Chairman (Mr. H. S. Button, J.P.) said that during the year the Directors had adopted a profit-sharing scheme, and established a pensions fund for the employees. At present there were 249 profit sharers; the bonus for the year (4 p.ct.) amounting to £1048. Company's stock to the value of £1000 had been purchased, of which £454 was being transferred to employees. The Board regarded the scheme as being in the highest degree conducive to economical and harmonious working. The pensions fund received as its nucleus a credit of £1900 from the Maidenhead Benefit Fund; and to this amount had been added contributions of £902 from the Company, and a similar sum from the members, of which there were 210. Discussing the accounts, Mr. Button said the figures showed the year had been one of development. Expenditure on capital account during the twelve months was £37,441, made up of: Works £10,721, mains £17,000, meters £4766, and lands acquired, including the excellent showrooms at Uxbridge, £4045. This figure represented an increase of 10 p.ct. The Company had laid 17½ miles of new mains, making a total of 252 miles, and had installed 1337 new meters and 1776 fires and cookers. The total number of ordinary meters was now 8527, which with 16,803 slot meters made a total of no less than 25,330. The number of stoves was 14,743. All these figures were in addition to meters, &c., owned by consumers. On the revenue account, the Company had spent on repairs and maintenance of works, plant, mains, &c., an amount equal to 24·11d. per 1000 c.ft. The value of gas sold was £155,184—an increase of £10,622 on 1924. The value of residuals sold was £33,436, a decrease of £4627. The amount of gas sold was 631 million c.ft.—an increase of 4·9 p.ct., and in this connection the Chairman said that he had watched the output grow under the guidance of the late Mr. H. E. Jones from about 65 millions, when he formed the Board in 1905. One point for comment in the accounts was that there was an increase of 10 p.ct. on capital expenditure, against an increase in the sale of gas of 5 p.ct. The increase was unavoidable. Estate development was proceeding with phenomenal speed over nearly the whole of the Company's area; and people were clamouring for gas. Present results were justifying the expenditure, for the Company were now getting increases in the sale of gas of 10 p.ct. to 14 p.ct. These increases were severely taxing their capacity; and in order to meet them, new holders would be erected at Gerrards Cross, where the business had grown considerably, and at Cookham and Colnbrook. The Company were also meeting the position from the manufacturing standpoint by the provision of additional plant at the Uxbridge Works. All this would necessitate the raising of further capital. Regarding the future of the gas industry, the Chairman said that with gas, by the use of large storage reservoirs, the equalization of load was a simple matter. The Company were already assisting development wherever it could be done without prejudice to existing consumers; while a continuing policy of amalgamation and co-operation with neighbouring companies was already producing inter-communication, larger works, and reduction in administrative costs. Dividends were declared of 5 p.ct. per annum on the 5 p.ct. preference stock; 5½ p.ct. on the 5½ p.ct. preference stock; and £6 12s. 6d. p.ct. on the ordinary stock and Maidenhead stock, all less income-tax. This will absorb £24,393, leaving £6045 to be carried forward to the current year's accounts.

Watford.

Presiding at the general meeting of the Watford Gas and Coke Company, Mr. E. J. Slinn (Chairman) said that the year had been marked by steady progress. It was a matter for encouragement that, in these strenuous and somewhat difficult times, they could show so good an increase in the sale of gas as 17 million c.ft. Demands for gas apparatus were well on the increase. He therefore thought they could look forward confidently to still better times in the future. The chief set-back had been the severe drop in the prices realized for residual products. The decrease in revenue from coke alone amounted to £4753. The cost of coals, oil, and wages showed an increase, due to the use of more raw materials and man-power. Expenditure on repairs of works, mains, and district apparatus showed a substantial decrease; and he thought they had this year reaped to some extent the benefit of the work put in over the years since the war. Rates and taxes showed a decrease of £444. This was on account of the settlement of negotiations in connection with the re-assessment of the Company's undertaking. The sale of gas and rentals of stoves and meters, &c., showed a total increase of £4217—a very healthy figure. Most of the new stock sold during the year, he was glad to say, was purchased locally. The Directors would put out further stock for tender during the year, if necessary, to meet the demands for new plant and mains. There was one happy feature in the accounts this year, and that was the reduction of mortgage interest from 7½ p.ct. to 5½ p.ct. per annum. They were unfortunately forced to raise this mortgage in 1919-1920, when gas undertakings generally found it difficult to obtain money. This reduction would mean a considerable saving to the Company year by year. He regretted that they had not been able to place any amount to the special purposes fund in 1925; but they hoped for better times in this direction during 1926.

Wellington.

At the annual meeting of the Company, the Chairman (Mr. C. W. Leake) said that during the year a considerable addition (£10,853) had been made to the capital account. This was almost wholly due to the need for extra storage. The revenue from gas showed an increase of £1260, but the yield from residuals was less by £500. With regard to the profit balance this year, it was £6093 against £6104 for 1924. Making allowance for the additional bank and legal charges incurred, the year's working was considered as good as 1924. The net revenue balance to be carried forward, subject to the dividend, was £4706, against £4693 for 1924. By interest on investments, and transfer of £137 from net revenue over the past two years, the reserve fund was growing steadily, and now stood at £3010 fully invested. Alluding to the increase in sales and consumers, the Chairman mentioned that the Company had now a total of 3252 consumers, with approximately 2000 gas cookers in use and many hundreds of fires, radiators, &c. During 1925, 200 new consumers were connected to the mains. Mr. R. J. Milbourne (Vice-Chairman) observed that a number of small gas-works were unable to supply gas at a reasonable price, and he suggested that State assistance might be given with advantage for the purpose of joining-up smaller works with larger ones. He referred to the linking-up of the Wellington Gas-Works with the Oakengates Works, which had proved satisfactory from all points of view.

Wolverhampton.

The annual general meeting of the Company was held on Feb. 24—the Chairman of Directors (Mr. A. B. Hanbury-Sparrow) presiding. In moving the adoption of the report and accounts, the Chairman said he thought the shareholders would consider the result of the year's trading very satisfactory. There had been an increase of 5 p.ct. in the output of gas. After allowing for payment of interest on the debenture stocks, and allocations to the special purposes and renewals funds, the available profit was £28,461. The Directors recommended dividends at the same rate as for the previous half-year—viz., 3 p.ct. on the preference stock; 5¼ p.ct. on the consolidated stock; and 3½ p.ct. on the new ordinary stock—and that £4738 be added to the reserve fund.

Worthing.

Moving the adoption of the report and accounts at the general meeting of the Company, the Chairman (Mr. W. Cash) said that the sales of gas had increased to the amount of £3643, and when they took into account the fact that the price of gas had been reduced from Michaelmas, and that if the earlier price had been in force the sales would have been up by another £1120, it would be seen that the increase in true figures would have been about £4700 for the half-year. The increase in quantity was equal to about 14 p.ct. in extra sales; and this showed the progress they were making and the healthy state of the undertaking. Taking into consideration the previous half-year, when the increase was 7·7 p.ct., it would be seen that there was an increase of 10¾ p.ct. for the whole year. If they went on like this, and compounded the increases, the whole business would double itself in seven years. They had used more coal in the past half-year, but the cost had been rather less. Residuals were down in common with other companies, and they had suffered severely in the price for these, the receipts being less by nearly £2800. The consequence was that the net coal cost worked out at nearly 4d. per 1000 c.ft. more than in the corresponding period. They would see that under the heading of repairs to works they were down nearly £2200; but on the other hand the cost of distribution was up by nearly the same amount. They were transferring £500 to the renewal fund account, making the carry-forward for the whole year £900, after providing for the dividend. The Chairman then moved that dividends at the rate of 5½ p.ct. on the preference stock, and 6½ p.ct. per annum on the consolidated ordinary stock be paid. An extraordinary general meeting followed; and this concerned the issue of new capital, to enable the Company to extend their operations.

"B.C.G.A." GAS ESSAY COMPETITION.

Official List of Prize Winners.

In last week's "JOURNAL" (p. 552) were published the names of the first 115 prize winners in this Competition. The following is a list of the 107 competitors who were awarded prizes of £1 1s. It may be repeated that no fewer than 11,000 essays were submitted to the "B.C.G.A."

Mr. Philip Frederick Victor Allan, 34, Lyncroft Mansions, Lyncroft Gardens, Hampstead, N.W. 3.
Mrs. Edith Baibi, 20, Challoner Mansions, West Kensington, W. 14.
Mr. Congreve Neville Banwell, 22, Barmouth Road, Shirley, Surrey.
Mr. L. C. Barber, 31, Leinster Gardens, Lancaster Gate, W. 2.
Miss Patti Bayley-Parker, Brook Cottage, Brook Road, Edgbaston.
Capt. Hubert Beaumont, 30, Dulverton Mansions, Gray's Inn Road, W.C. 1.
Mr. S. T. Bindoff, 7, Connaught Terrace, Hove, Brighton, Sussex.
Miss Dorothy Bishop, 61, Torrington Square, W.C. 1.
Mr. George McArthur Boyle, "Hawbank," 49, Loughborough Road, Kirkcaldy, Fife.
Mr. Geoffrey Bradley, Marks Tey Hall, Marks Tey, Essex.
Mr. John Brown, Tinto View, Ashgill, Lanarkshire.
Mrs. Gillies Campbell, Leahurst, Wellington, Shropshire.
Mrs. H. G. Campbell, 17, St. Stephen's Square, Bayswater, W. 2.
Mr. V. Carter-Watson, 5, Homefield Road, Chiswick, W. 4.
Miss Alice M. V. Coleman, 35, Cromwell Road, Forest Gate, E. 7.
Mrs. Joan Cooke, 43, Billing Road, Northampton.
Mr. C. E. Cox, 4, Rainville Road, Kirkstall, Leeds.
Mr. D. W. Croft, Red Cottage, Esher, Surrey.
Mr. Alexander Cruikshank, Surveyor to the Bank of Scotland, 77, Spottiswoode Street, Edinburgh.
Mr. John J. Curtis, Westerdale, Oakleigh Park Drive, Leigh-on-Sea, Essex.
Mr. Henry Charles Day, "Rivelin," Newbold, Chesterfield.
Mr. F. E. Dempster, 70, Lancaster Gate, W. 2.
Mr. J. M. Eddison, 34, Rosebery Street, Aberdeen.
Mr. Garbett Edwards, Secretary, Dinam Estates Co., The Offices, Llandinam, Mont.
Mr. Alexander Ferguson, Meadow View, Carronshore, Falkirk.
Miss Marguerite Finch, "Bosingham," East Horsley, Surrey.
Capt. J. W. Flavell, 12, Whatman Road, S.E. 23.
Mr. George Francis Forden, 23, Schubert Street, Seaforth, Liverpool.
The Rev. H. W. Fox, 6M, Artillery Mansions, S.W. 1.
Mrs. James Francis, 22, Eldon Street, Greenock.
Mr. Ernest Frank Furtado, Ferney Lodge, Osidge Lane, N. 14.
Mr. Percival C. S. Gillard, 7, Alexandra Road, Bridgwater, Som.
Mr. George E. Goldie, 12, Darlaston Road, Wimbledon, S.W. 19.
Mr. John Goodliffe, 95, Inville Road, Walworth, S.E. 17.
Mr. W. D. Graddon, 44, King's Avenue, Woodford Green, Essex.
Mrs. Greenstreet, "Elon," Dane Crescent, St. Luke's Avenue, Ramsgate, Kent.
Mr. W. E. Hall, Warrant Officers' Mess, H.M.S. "Royal Sovereign," c/o G.P.O., London.
Mr. John Philip Harrison, 31, Glyn Mansions, Kensington, W. 14.
Mr. Frank Harold Hayman, Park Road, Redruth, Cornwall.
Mr. Charles Hill, 49, Cedar Lawn Avenue, Barnet, Herts.
Mr. Joseph Stephen Jeffs, 123, Stanmore Lane, Winchester.
Mr. Gordon Jennings, 264, Kennington Park Road, Kennington Gate, S.E. 11.
Mr. Harry Keightley, "Machon Bank," Carr Lane, Glass Houghton, Castleford, Yorks.
Mr. Ernest Harry Kemp, 8, Arodene Road, Brixton Hill, S.W. 2.
Mr. J. R. Kerfoot, Moraincot, Grassington, Skipton, Yorks.
Mr. J. P. Kirby, 30, Morley Road, Lewisham, S.E. 13.
Mr. Bertram Lancaster, 11, The Paragon, Blackheath, S.E. 3.
Mr. John Lattimer, 39, Ladysmith Road, Edinburgh.
Mr. J. R. Leech, 9, Selly Oak Road, Bourneville, Birmingham.
Mrs. Ethel Levien, 87, Harrow View, Harrow.
Mrs. M. F. Lewer, 143, Longley Road, Tooting, S.W. 17.
Mr. William Lottimer, 90, Forth Street, Glasgow, S. 1.
Mr. E. A. McKerrow, Kirklinton, Copthorne, Sussex.
Mr. Ernest Stuart McCombie, 321, Hainault Road, Leytonstone, E. 1.
Mr. Donald H. MacLean, B.A., 34, Stanfield Road, Burslem, Stoke-on-Trent.
Mr. William Peterkin Masson, School House, New Aberdour, Fraserburgh, Aberdeenshire.
Mr. Donald Maxwell, The Beacon, Borstall, Rochester.
Mr. Thomas Hosker Minton, Grenville, Derby Road, Widnes, Lancs.
Mr. Albert Morse, 20, Sunbury Way, Hanworth, Middlesex.
Miss C. S. Murphy, 178, Birchanger Road, Woodside, S.E. 25.
Mrs. Rose Newcomb, 56, Fawnbrake Avenue, Herne Hill, S.E. 24.
Mr. Frank Oates, 4, Newton Mansions, Queen's Club Gardens, W. 14.
Mr. E. J. Orman, 3, St. Leonards Road, Ayr, Scotland.
Miss Christabel Osborn, 101, Stamford Street, S.E. 1.
Dr. Pallister, 27, Hendon Burn Avenue, Sunderland, Co. Durham.
Dr. J. R. Partington, Kingsbury Close, Kingsbury, N.W. 9.
Mr. Fred Patrick, 12, Bourne Terrace, Thackley, Bradford, Yorks.
Miss Beatrice Petty, Rothesay, Caversham, Oxon.
Mr. Edgar Royston Pike, 3, Milton Road, Gorringe Park, Mitcham, Surrey.
Mr. F. J. Posselwhite, 68, Deyncourt Gardens, Upminster, Essex.
Mr. Philip C. Pratt, 8, Margaret Road, Harborne, Birmingham.
Mr. G. W. B. Raines, 29, Alverthorpe Street, South Shields.
Mrs. F. Randall, Vale View, Pickering, Yorks.
Miss Maude Raymer, The Dyke, Denmark Road, Exeter, Devon.
Miss Edith E. Rednall, 10, Queen's Terrace, Wokingham, Berks.
Mr. G. L. Reveirs, 12, Hollingbourne Road, Herne Hill, S.E. 24.
Dr. T. Basil Rhodes, "Cranleigh," Burnell Road, Sutton, Surrey.
Mrs. Ann Richardson, 8, Woodfield Road, Ealing, W. 5.
Miss Alfreda Richmond, 15, Ommaney Road, New Cross, S.E. 14.
Mr. John Roy, 19, Gala Street, Riddrie, Glasgow.
Miss Florence Sanders, The Hollies, Green Lane, Redruth.
Miss Gladys Seage, 30, Park Road, Polsloe Park, Exeter.
Miss Mary Shaw, 37B, Newton Street, Greenock.
Mr. William Douglas Sheppard, 4, Highbarrow Road, Addiscombe, Surrey.
Mr. W. E. Smithson, Hillside, Patching Hall Lane, Chelmsford, Essex.
Rev. J. F. S. Solomon, B.A., 54, Grove Lane, Ipswich.
Mrs. Winifred B. Stansby, Yelverton Hall Farm, near Norwich, Norfolk.
Mrs. G. R. Stewart, Bromfield, Carlisle, Cumberland.
Mr. James Stuart, 10, Ashmore Street, Sunderland.
Mr. A. B. Swallow, Sidney Sussex College, Cambridge.
Mr. Ernest Thomas Tacagni, 95, Falmouth Avenue, Highams Park, Chingford, E. 4.
Mr. George Taylor, 28, Ullswater Road, Southgate, N. 14.
Mr. William Taylor, 4, Florence Road, Sanderstead, Surrey.
Mr. Frederick Rhodes Tillotson, "Wharfedale," Ormond Avenue, Hampton, Middlesex.
Miss Gwladys Thomas, 2, Portland Place, Bath.
Mr. John Thomson, 19, Woodside Avenue, Rutherglen, near Glasgow.
Miss Margaret Tomlinson, 4, Albert Drive, Orrell Park, Liverpool.
Mr. L. V. Upward, 14, Lyndhurst Road, Hampstead, N.W. 3.
Miss Jean H. Wallace, U.F. Manse, Cunningsburgh, Shetland.
Dr. Robertson Wallace, M.B., C.M., Cromwell House, High Holborn, W.C. 1.
Mr. W. J. Warry, "Ashburton," Tatsfield, Surrey.
Miss Rosamond H. Whatmore, 141, Brooke Road, Stoke Newington, N. 16.
Rev. John W. Whittaker, 21, Victoria Street, Ely, Cambs.
Mr. C. H. Wilcher, 118, Elms Vale Road, Dover, Kent.
Mr. G. Williams, "Hunstanton," 23, Rochdale Road, Plumstead, S.E. 18.
Mr. William Wright, c/o McNeill, 21, "B" Block, Barleith, Hurlford, Ayrshire.
Dr. F. E. Wynne, Medical Officer of Health, Town Hall, Sheffield.

ELECTRICITY.

Applications for Special Orders for Capital Powers.

THE ELECTRICITY COMMISSIONERS (STATUTORY GAS COMPANIES CAPITAL POWERS) RULES, 1926, DATED FEB. 9, 1926, MADE BY THE ELECTRICITY COMMISSIONERS IN PURSUANCE OF SECTION 34 OF THE ELECTRICITY (SUPPLY) ACT, 1919, WITH RESPECT TO APPLICATIONS BY STATUTORY GAS COMPANIES FOR SPECIAL ORDERS IN PURSUANCE OF THE STATUTORY GAS COMPANIES (ELECTRICITY SUPPLY POWERS) ACT, 1925.

The Electricity Commissioners state that the following Rules should come into immediate operation.

MODE OF MAKING APPLICATION.

Rule I.—Every application for a Special Order to authorize a Statutory Gas Company* to apply their funds or to raise capital or borrow money for electricity purposes (in these rules referred to as the "Order") must be made by memorial addressed to the Secretary, Electricity Commission, Savoy Court, Strand, W.C. 2.

* *Note.*—**The Commissioners will not entertain applications from Companies registered under the Companies Acts, 1908 to 1917, for Special Orders in respect of the objects mentioned in Rule 1 above, as appropriate machinery is provided under the general law for effecting those objects.**

NOTICES WHICH MUST BE GIVEN.

Rule II.—Applicants for an Order must publish notice by advertisement (hereinafter referred to as "the advertisement") of their intended application, and the advertisement must contain the following particulars:

(1) The objects of the application.
(2) The address and description of the applicants.
(3) An intimation that every local or other public authority, company, or person being desirous of bringing before the Electricity Commissioners any objection respecting the application, may do so by registered letter, addressed to the Secretary of the Commission as aforesaid and dispatched within thirty days from the date of the publication of the advertisement in the local newspaper, and that a copy of such objection must also be forwarded to the Parliamentary Agents or Solicitors for the Order.
(4) The address of an office in London and of an office within the existing or proposed area of electricity supply, at which printed copies of the draft Order, as applied for, and of the Order as made, can be obtained at a price of not more than 2s. each.

The advertisement must be inserted once in a local newspaper circulating in the district or districts to which the application relates, and once in the *London* or *Edinburgh Gazette*, as the case may

require, as soon as possible after the publication in the local newspaper.

No part of the month of August shall be included in calculating the above-mentioned period of thirty days.

Preparation of the Order.

Rule III.—(1) The applicants must in each case prepare a draft of the Order.

(2) The draft Order must be printed on one side of the paper only, and each Schedule annexed must begin a new page.

(3) The names and addresses of the Parliamentary Agents or Solicitors for the Order must be printed on the outside of the draft Order.

(4) There must be a notice at the end of the draft Order stating that any objections must be made by letter sent by registered post addressed to the Secretary, Electricity Commission, as aforesaid, on or before a certain date (to be specified in such notice), being thirty days from the date of the publication of the advertisement, and that a copy of any such objections must at the same time be forwarded to the Parliamentary Agents or Solicitors for the Order.

(5) The draft Order must contain the address and description of the applicants.

Deposits to be Made.

Rule IV.—On or before the date of the publication of the advertisement the applicants must deposit at the Office of the Electricity Commission :

(1) A copy of the advertisement.
(2) The memorial signed or sealed by or on behalf of the applicants.
(3) Six printed copies of the draft Order.
(4) A statement of the existing capital and borrowing powers, showing the amounts authorized, raised, and expended.
(5) A certified statement showing under separate heads the purpose for which the proposed capital or borrowing powers is or are required, and the amount required for each purpose.
(6) A copy of the printed accounts of the applicants for the half-year or year next before the date of the application.
(7) A list of every Special Act of Parliament and Order having the force of an Act relating to the applicants.
(8) A certified copy of a resolution approving the application for the Order passed by shareholders or stockholders qualified to vote at ordinary meetings of the applicants who were present either in person or by proxy at a general meeting, and who held at least three-quarters of the paid-up capital of the applicants, represented by the votes at such meeting.

A certified copy of the notice convening the meeting should also be furnished.

(9) A fee of £35 by cheque payable to the Secretary, Electricity Commission, to cover ordinary expenses. If in consequence of inquiries or otherwise additional expense is incurred, the amount will be charged to the applicants, and must be paid by them in addition to the ordinary fee.

Provided that in the case of an Order which also contains provisions in respect of which the Electricity Commissioners Rules, 1920, are applicable, only one fee of £35 to cover ordinary expenses need be paid.

On or before the same date the applicants must deposit a copy of the advertisement and of the draft Order at the office of the Board of Trade.

On or before the same date the applicants must deposit for public inspection a copy of the advertisement and of the draft Order as follows :

In England or Wales :

At the office of the clerk of the peace in England and Wales of every county, riding, or division wholly or partly within the existing and any proposed area of electricity supply, and also at the office of the local authority of every district wholly or partly within the existing and any proposed area of electricity supply.

In Scotland :

At the office of the principal sheriff clerk for each county wholly or partly within the existing and any proposed area of electricity supply, and, where any county is divided into districts for sheriff court purposes, at the office of the sheriff clerk in each of such districts wholly or partly within the existing and any proposed area of electricity supply, and also at the office of the local authority of every district wholly or partly within the existing and any proposed area of electricity supply.

In the case of an Order relating to the Administrative County of London, the applicants must on or before the same date deposit a copy of the draft Order at the office of the London County Council.

In the case of an Order relating to the district of a joint electricity authority, the applicants must on or before the same date deposit a copy of the draft Order at the office of the joint electricity authority.

On or before the same date the applicants must deposit a sufficient number of printed copies of the draft Order at an office in London and at an office within the existing or proposed area of electricity supply, and a copy must be furnished to all persons applying therefor at a price of not more than 2s. each.

Objections to Grant of Order.

Rule V.—Any person desirous of objecting to an Order must do so within thirty days from the date of the publication of the advertisement. Such objections must be sent by registered letter addressed to the Secretary, Electricity Commission, as aforesaid.

Such letter must be signed by the person objecting, or by some responsible and duly authorized person on his behalf. It must state the interest of the person objecting in the subject-matter of the Order, and must state concisely what his objections are.

If any person desires to suggest any clauses or other amendments for insertion in the Order, he must forward with his letter a copy of any such clauses or amendments. At the same time a copy of any such letter, clauses, or amendments must be delivered to the Parliamentary Agents or Solicitors for the Order.

No part of the month of August shall be included in calculating the above-mentioned period of thirty days.

Proof of Compliance with the Foregoing Rules.

Rule VI.—The Parliamentary Agents or Solicitors for the Order must be prepared to prove compliance with the provisions of the foregoing rules when required by the Electricity Commissioners. Six days' notice will be given of the day and hour at which such Agents or Solicitors are to attend for the purpose at the office of the Electricity Commission, and printed forms of proof will accompany the notice. These forms must be filled up and brought with the requisite documents to the office of the Electricity Commissioners at the time fixed for receiving proof.

Steps to be Taken after Order is Granted.

Rule VII.—When an Order has been granted by the Electricity Commissioners and delivered to the applicants, they must forthwith deposit printed copies for public inspection at the offices where the draft Order was deposited, and must supply copies to all persons applying for the same, at a price of not more than 2s. each, and must further publish the same as the Electricity Commissioners may direct.

Proof of compliance with this Rule must be made within fourteen days from the grant of the Order in such manner as the Electricity Commissioners may direct.

Rule VIII.—These Rules may be cited as the Electricity Commissioners (Statutory Gas Companies' Capital Powers) Rules, 1926, and shall come into operation from the date hereof.

R. T. G. French,
Secretary to the Electricity Commissioners.

Feb. 9, 1926.

SOUTH SUBURBAN GAS ORDER.

Standard Price Revision.

A Special Order promoted under section 10 of the Gas Regulation Act, by the South Suburban Gas Company, was the subject of inquiry of Mr. J. F. Ronca (Director of Gas Administration) at the offices of the Board of Trade on Monday, March 1. The main purposes of the Order are to fix a new standard price for the Company, to provide for future revision, and to increase the borrowing powers.

The proceedings were a sequel to the application which was made last year by the London County Council and the Croydon Corporation for a reduction of the Company's standard price, under section 1 of the Gas Regulation Act. On Nov. 3 last the hearing of the application was postponed, at the instance of the Company, on the ground that, owing to the Company's particular circumstances, revision in the manner proposed would do a very serious injury to them; and they wished to consider an application to the Board of Trade under section 10 of the Gas Regulation Act, or to Parliament, for revision of their standard price. This course was agreed to by the London County Council and Croydon Corporation on that occasion. [See "Journal" for Nov. 11, 1925, p. 366.] The present proposal was to fix the standard price at 12·4d. per therm (the existing standard price is 15d.); but the London County Council, the Croydon Corporation, and the Dartford Urban District Council contended that it should be lower, the figure proposed by the County Council being 11·4d. per therm

The Company were represented by Mr. W. E. Tyldesley Jones, K.C., and Mr. Jacques Abady; the London County Council, by Mr. Rowand Harker; the Croydon Corporation, by Dr. J. M. Newnham (Town Clerk); and the Dartford Urban District Council, by Mr. James Hureley. It was stated that a number of other local authorities raised objections, but had left the matter in the hands of the London County Council.

Mr. Tyldesley Jones said that there had been some difference of opinion as to the proper way to apply the proviso to section 1 of the Act dealing with revision of the standard price. If the views of the London County Council were held to be correct, it would have the effect of doing the Company an injustice; whereas if the Company's contention was correct, this injustice might not be done. As an indication of how the application of the proviso, as interpreted by the London County Council, would do serious injury to the Company, he said that shortly before the war the Company had had amalgamated with them the undertakings of two other Companies. Such amalgamations were generally carried out on the assumption that the economies effected by the larger-scale working would be such as to enable the amalgamated Company to carry on their business more efficiently and economically, with advantage to consumers and shareholders alike. The result of applying the proviso as he understood the London County Council contended it should be applied, would be that all the economies resulting from the enlarged business done by the Company would be taken away from them. This would be a very serious injustice. The Company admitted that since 1921, when the present standard price of 15d. per therm was fixed, costs had de-

creased, and that this standard price must be reduced. The Company had considered whether they should proceed by promoting a Bill in Parliament or by applying for a Special Order; their view being that either course was open to them. They had concluded that it was preferable to keep the matter before the Board of Trade. He understood, however, that the London County Council raised the point as to whether the Board of Trade had jurisdiction, under section 10, to fix a new standard price.

Mr. Harker said he did not intend to raise the point on the present occasion, though the Council might wish to do so in the future. He had said, in November, that if the Company promoted an Order under section 10, the Council would not raise the question of jurisdiction; and it seemed, therefore, that it would be ungracious to do so.

Mr. Ronca said this left the Board of Trade rather in the air with regard to their powers.

Mr. Tyldesley Jones agreed that it was desirable to have the matter on a perfectly regular basis; and he released Mr. Harker from any idea of having said anything in November which prejudiced him now. If the Board of Trade made an Order reducing the Company's standard price, he considered it would be effective. But even if the Company proceeded on the basis that the Order was *ultra vires*, they would soon be corrected by an application to Parliament, the costs of which the Company would probably have to pay. On the other hand, the Board of Trade did not want to make an Order which was *ultra vires*. He asked the Board, therefore, to give a ruling on the matter, because, if it were held that the Board had no jurisdiction, he wanted immediately to publish the necessary notices, and deposit a Bill, and ask Parliament to suspend the Standing Orders, so that he could proceed with the Bill at once. Section 10 stated that "anything which, under the Gas and Water Works Facilities Act, 1870, or any Act amending the same, may be effected by a Provisional Order confirmed by Parliament, may, so far as those enactments relate to gas, be effected by a Special Order made on the application of any local authority, company, or person by the Board of Trade under, and in accordance with, the provisions of this section. . . ." It was also stated that, without prejudice to the generality of the powers conferred by the section, the Board of Trade might by such Special Order authorize gas undertakings to do certain things, some of which were clearly covered by the express terms of the Gas and Water Works Facilities Act, 1870, and others were not. One of the things which the Board of Trade were authorized to do under section 10 was to modify or amend the provisions of any Special Act or other provision relating to the undertaking affected by the Special Order, as might be necessary to provide for the proper and efficient conduct of the undertaking. Under section 3 of the Act of 1870, power could be given by Provisional Order to construct or maintain and continue gas-works and works connected therewith, or to manufacture and supply gas. Counsel said this did not mean that a Provisional Order under that section merely gave power to maintain the gas-works themselves; it gave powers for the purpose of continuing gas-works, and power to charge was essentially one of those. It also could give power to raise additional capital. Again, section 12 of the 1870 Act stated that undertakers empowered by any Provisional Order under the Act might demand and take in respect of gas or water supplied by them under the authority of such Provisional Order rents and rates respectively not exceeding the sums specified and according to the regulations specified. Thus, the fixing of a standard or maximum price was clearly within the powers of the 1870 Act. The 1920 Act made it perfectly clear that the powers conferred upon the Board of Trade by the 1870 Act were to be construed in a very wide sense; and therefore he submitted that the powers of the Act of 1870, especially as interpreted and expanded by section 10 of the 1920 Act, were wide enough to authorize the granting of an Order fixing a new standard price. The fact that section 1 of the Act of 1920 provided for fixing the standard price in certain circumstances did not exclude the Board of Trade's jurisdiction under section 10 to make an Order such as they might have made before the passing of the 1920 Act.

Mr. Ronca asked what Counsel meant when he referred to a "new" standard price, and whether he confined his remarks to the fixing of a standard price for the first time.

Mr. Tyldesley Jones replied that the Board of Trade could fix a new standard price or revise an existing one. Illustrating his point, he said that if the Company came to the Board of Trade with a scheme for amalgamating two or three undertakings, the Board might point out that there were different standard prices applicable to the different undertakings, and that they must decide the standard price for the amalgamated undertaking. He submitted that the Board had full jurisdiction to do this, and, in fact, it had been done by the Board in the past. Otherwise the Board would be authorizing an amalgamation, and each part of the amalgamated undertaking would apparently retain its old standard price, although the proper standard price which should be applicable to the amalgamated undertaking would probably be different from that obtaining in any one of the previous separate undertakings.

Mr. Harker asked Mr. Ronca to bear in mind that in the present case the Company were promoting an Order under section 10 of the 1920 Act, not to fix a new standard price for a new undertaking such as would arise in the event of an amalgamation, but to amend the standard price of an existing undertaking. The suggestion that the power to "continue" gas-works, under section 3 of the 1870 Act, authorized the Board of Trade to fix a new standard price, was ill-founded. The only reasonable construction that could be put upon it was that it did not deal with the question of price at all, but with the question of authorizing the construction, maintenance, and continuance of gas-works; and therefore the Board of Trade had no jurisdiction under that section to deal with price. This submission was fortified by section 12 of the 1870 Act. Mr. Tyldesley Jones had said, in substance, that even if there were no authority under section 3 to fix a new standard price, there was power to do so under section 12.

Mr. Tyldesley Jones said that what he had intended to convey was that section 12 was not a new power, but showed quite clearly that the power to fix the standard price was intended to be contained in section 3.

Mr. Harker replied that if there was power under section 3 to fix a standard price, then section 12 was quite unnecessary. Section 12, however, did not say a word about "standard" price. It gave the Board of Trade power to fix "maximum" prices; and he pointed out that, at the time the 1870 Act was passed, the "standard" price had not been introduced. There was nothing whatever to prevent a standard price company demanding and taking sums for their commodity exceeding the sums specified in a Provisional Order, if the Provisional Order prescribed "standard" prices. The whole scheme of the section was quite inappropriate, and was not intended to cover the case of standard price companies, who charged what they liked, subject to the limitations with regard to dividend. Whatever might have been done by the Board in the past, there was no power, under sections 3 and 12 of the 1870 Act, to fix a standard price, even in the case of a new undertaking.

Mr. Ronca, referring to the statement that under section 12 the Board had power to fix a "maximum" and not a "standard" price, asked whether this argument did not turn largely on the interpretation put upon the word "sums," and on pre-suppositions with regard to the "regulation specified." They might have fixed the price on a sliding-scale basis, and made the conditions of the sliding-scale the "regulations specified" in the Provisional Order.

Mr. Harker replied that he thought it would. He was prepared to admit that the Board of Trade had, rightly or wrongly, made Orders fixing a standard price; but, so far as he knew, the point had not been challenged until the present case. If he were right in the submission that the Board could not, by Special Order, declare a standard price as distinguished from a maximum price, then the present case could not arise under section 10 of the 1920 Act, because the Company were a standard price Company. If he were wrong in this, however, he submitted that the provisions of section 10 did not entitle the Board to modify or amend the provisions of a Special Act fixing the standard price.

Mr. Tyldesley Jones said Mr. Harker's submission that it was the practice of the Board of Trade to make Orders under the 1870 Act to fix new standard prices was sufficient to settle the point, because one principle of law was that, when there was an Act of Parliament under which a certain administrative practice had grown up—whether it was originally right or wrong was immaterial—if Parliament, at a later date, while knowing this administrative practice, enacted something to the same effect as the earlier Act, the Courts would hold that Parliament had intended that administrative practice to continue, and that the later Act must be so construed and applied. There were a number of cases; and the principle had been enunciated in the House of Lords more than once. Therefore, even assuming Mr. Harker to be right in saying that the 1870 Act did not authorize the fixing of standard prices, Parliament had in 1920, knowing what the administrative action under the 1870 Act was, said that the Board of Trade could continue to do anything that was done under the 1870 Act. As to the suggestion that section 12 of the 1870 Act authorized the fixing of maximum and not standard prices, he said that a standard price was merely a variable maximum price, and that the word "standard" was adopted to distinguish between a fixed and a variable maximum.

Mr. Ronca did not give his ruling immediately as to whether the Board had power to make the present Order under section 10.

Mr. Tyldesley Jones therefore proceeded to present the Company's case. He dealt briefly with the history of the Company, from its incorporation in 1858, as the Crystal Palace District Gas Company, onwards. In 1906 the standard price was fixed at 2s. 9d. per 1000 c.ft., the dividend being 5 p.ct., subject to a slide of 1s. 8d. p.ct. per half-year for every 1d. increase or decrease in the price of gas. In 1912 there were amalgamated with the South Suburban Company the undertakings of the Bromley and Crays Gas Company and the West Kent Gas Company, differential charges being allowed in the areas previously supplied by the two latter Companies, for limited periods. The differential prices in the Bromley Company's area decreased gradually, and ceased on June 30, 1925. In the case of the West Kent Company's area, the differential was reduced by 1d. per 1000 c.ft. each year. For the year ended June 30, 1925, it amounted to 7d. At present it was 6d.; and it would disappear on June 30, 1931. The intention was to enable the South Suburban Company, by reason of the amalgamation, to effect economies by spreading their charges, and to enable them to charge less for gas in the added areas. With a view to effecting the economies contemplated, they had obtained an Act in 1914 authorizing the construction of works at Belvedere, on the Thames. He emphasized the importance of the fact that the new works were to be on the Thames, from the point of view of obtaining coal supplies cheaply by water transport. Owing to the war, the works had not been constructed. The Company had their own works at Sydenham; and these being far more economical than those of the amalgamated Companies, the manufacture of gas was concentrated at Sydenham, and the smaller works were closed down, though it was recognized that the Sydenham works could not continue for long to supply the needs of the whole of the area. The extra cost of constructing the Belvedere works at post-war prices, however, would have discounted the advantages which would have been obtained by concentrating the manufacture of gas there. It might be that it was merely a case of postponement; but it would be postponed for some little time to come. In the meantime, the consumption of gas had increased very rapidly; and in the year ended June 30, 1925, the gas sold had exceeded the amount sold in the year to June 30, 1914, by over 58 p.ct. As the result of the increased consumption, the Company had had to re-open some of the smaller gas-works, and, of course, could not manufacture so economically as they would have been able to do had the Belvedere works been constructed. As against this, the differential prices authorized had disappeared, except in the one case; and this fact was of consider-

able importance to the revenue. By an Act of 1918, the undertaking of the Dartford Gas Company was transferred to the South Suburban Company. In that case there was a differential of 2d. per 1000 c.ft. in the Dartford area above the price charged in the South Suburban Company's original area; but this differential ceased in December, 1923. In 1921 a Therm Order was obtained from the Board of Trade, fixing the standard price at 15d. per therm, a figure which the Company recognized must now be reduced. The circumstances of the Company, however, were unlike those of any other whose standard price had been revised under section 1 of the Gas Regulation Act; and they were entitled now to ask the Board of Trade to fix a fair price, having regard to all the circumstances. In the present Order as originally presented, a new standard price of 13d. per therm was asked for. The London County Council, in their objections, had asked the Board of Trade, if the Order was allowed to proceed, to reduce that to such a figure as the Board might be satisfied represented a fair and reasonable standard price as between the consumers and the shareholders, due regard being had to all the circumstances of the case—particularly to the present cost of manufacture and distribution of gas, and to the rate of dividend to which the shareholders were entitled in view of the past history of the Company—such new standard price to operate as from Jan. 1, 1926. This was a very fair statement of the way in which the standard price should be fixed, and it was in accordance with precedent, Parliament having acted in that way when fixing the standard price for a new company. The Company, however, now asked for a standard price of less than 13d. per therm, because, since the original application was made, they had effected very favourable coal contracts. Whether they would be able to maintain the prices now fixed, he did not know. It might be that the Company were injudicious in asking the Board of Trade to act upon present prices; but their folly would be greater if they asked that the standard price, which was to be based on those coal prices, should not be subject to revision for five years. There was originally a clause in the Order to this effect; but, although there were advantages in not having revision too frequently, and although the practice of Parliament was to provide for revision at fixed periods, and not annually, there had been objections by local authorities to a period of five years in the present case. Further, if the new price were standardized for five years, he would have to ask for a margin to cover possible increases in the price of coal, inasmuch as the new standard price was to be based on favourable coal contracts. Therefore he now asked that the standard price should be subject to revision at any time. Thereby he would be meeting the objections of the local authorities, and also would be leaving it open to the Company to ask for an increased standard price if coal prices went up. The standard price he asked for was 12·4d. per therm.

Mr. *George Evetts* (Consulting Engineer to the Company) then gave evidence, and produced tables to justify a standard price of 12·4d. per therm. The present net cost of manufacture and distribution of gas, based on the 1925 results, was 8·39d. per therm. The capital charges which would be necessary for the efficient carrying on of the undertaking amounted to 1·93d. per therm; and he estimated the economic selling price as 10·4d. per therm. The rate of interest on ordinary capital which he considered should be paid was 6½ p.ct. This represented nine increments of dividend over the standard dividend of 5 p.ct., each increment being 3s. 4d. p.ct. per annum in respect of each reduction of 0·2d. per therm in the price of gas below the standard price. To allow this dividend to be paid, therefore, he had added other points of 0·2d. per therm—*i.e.*, 1·8d.—to the economic selling price of 10·4d., making 12·2d. He had also added a margin for minor emergencies, amounting to 0·2d., making the standard price 12·4d. per therm. It was impossible to estimate what the saving resulting from the use of the Belvedere works would have been. Discussing the details of his tables, he said there was no guarantee that the Company would continue to get their coal at present prices after existing contracts expired; nor was there a guarantee that they would get the coal contracted for at the present prices, in view of the possibilities in the coal industry next May. The present capital charges were 9·65d. per 1000 c.ft.; and assuming a 5 p.ct. increase of business in 1927 the charges would be increased to 10·53d.

Witness, replying to Mr. HARKER, in cross-examination, said that the Company still possessed the Belvedere site, and it might be that they would construct the works in the future. They would not do so, however, unless they were assured of securing economies.

Mr. HARKER, having secured the opinion from witness that economies effected as the result of the construction of the Belvedere works would be circumstances within the control of the Company, said that, under the revision clause in the Order, if those works were constructed and economies secured, any local authority desiring to have the standard price revised could not obtain such a revision, because the construction of the works was a circumstance within the Company's control.

Witness agreed that if the construction of the Belvedere works was the only reason for the application, the local authority would have no ground for revision.

Tables prepared by Mr. Arthur Valon (Messrs. W. A. Valon & Son, civil engineers, Westminster), on behalf of the London County Council, were then handed to witness, and compared with his own. Mr. Evetts' figure for the net cost of supply of gas was 41·97d. per 1000 c.ft., and Mr. Valon's was 41·65d.—a difference of 0·32d. per 1000 c.ft., or 0·06d. per therm. It was pointed out that the two items which accounted for the difference were the charges for co-partnership and for national insurance. In regard to the latter, Mr. Evetts had added £1200 to the 1925 charges, this being due to extra insurance payments; and his explanation was accepted. This left the question of co-partnership outstanding; Mr. Valon having assumed a bonus of 4¾ p.ct., which was the percentage paid in 1925, whereas Mr. Evetts had taken 6 p.ct.

Mr. HARKER said the criticism was that the Company should not reasonably be allowed any sum other than that which they were at present paying or intended to pay.

Witness replied that he had estimated that, on the present selling price of gas, a bonus of 6 p.ct. was justified. In 1913 it was 7¼ p.ct.

Further examination of the tables showed that the essential difference between the Company and the London County Council was in respect of capital charges. Mr. Valon had arrived at a new standard price of 11·4d. per therm, against Mr. Evetts' figure of 12·4d. Whereas Mr. Evetts had worked on the basis of nine increments of dividend above the standard, to make the dividend on ordinary stock 6½ p.ct., Mr. Valon had assumed six increments of dividend, making a dividend of 6 p.ct. In Mr. Valon's tables the present capital charges represented 9·11d. per 1000 c.ft., and in Mr. Evetts' tables they represented 9·65d.

Cross-examination was directed to Mr. Evetts' figures of further capital expenditure. It was estimated that £250,000 would be spent on works in 1926, as well as £50,000 on mains, meters, prepayment installations, &c., and another £50,000 on mains and meters in each of the following four years. Mr. Evetts said that the work would commence almost at once. Payment would begin to be made in the present year, and early next year the interest would have to be paid. He considered that, in fixing a new standard price, it was proper to take into consideration the interest on capital which would have to be raised in the future.

Mr. TYLDESLEY JONES pointed out that Parliament had always done this.

The inquiry was adjourned until Monday, March 8.

LEATHERHEAD GAS ORDER.

Discussion on Co-Partnership.

Mr. J. F. RONCA (Director of Gas Administration) held an inquiry on Monday, Feb. 22, at the offices of the Board of Trade, into an Order promoted by the Leatherhead Gas and Lighting Company, under section 10 of the Gas Regulation Act. The Order authorizes the issue of new capital to the extent of £80,000, with borrowing powers up to one-half the issued capital, the standard dividend to be 5 p.ct.; the erection of houses for employees, and offices, showrooms, and other buildings for the purposes of the undertaking, on the lands of the Company; and the establishment of a profit-sharing scheme. There are a number of miscellaneous clauses in the Order.

The only opposition was in respect of the co-partnership scheme by Mr. H. V. Roe. There were present on behalf of the Company Mr. W. H. Bennett (Director), Mr. John Young (Secretary), and Mr. D. F. Irving (Engineer).

Mr. BENNETT said that the main point of the opposition was the question as to whether the bonus to be given to the employees under the co-partnership scheme should be a charge upon the general revenue account or upon the profit and loss account; and he referred to a letter written by Mr. Roe to the Director of Gas Administration, suggesting the insertion of a provision that the profits shared by the employees should not be allowed as an expense for the purpose of estimating the standard price. It was pointed out by Mr. Bennett that some forty gas companies had adopted co-partnership; that something like 54 p.ct. of the total output of gas in the British Isles was manufactured under co-partnership rules; and that, so far as he could trace, there was no precedent for co-partnership items being charges against profit and loss account. The Board of Trade, in the schedule which gas companies had to prepare when applying for a Therm Order, recognized co-partnership as being a charge against the revenue; while the Income-Tax Authorities also allowed the bonus to be treated as a trading expense. If the charge were to fall upon the net profits of the undertaking, it would be necessary for the Company immediately to apply for a revision of their standard price. He believed he was right in saying that, in every case where co-partnership had been adopted (and the personally had been connected with three schemes, in which the bonus was a charge on revenue) the result had been, not to necessitate an increase in the price of gas, but, by reason of the co-operation of the employees, to decrease it—that being, of course, the object of co-partnership. It was not necessary to make an application for powers to adopt co-partnership; but the Company were putting in the application so that they could adopt those special provisions which permitted the Trustees or Directors of the Company to deal with the money standing to the credit of a deceased co-partner. Letters written by Mr. Roe rather suggested that he had no objection to co-partnership as such; but he had made the point that there was no provision for dealing with the payment of bonus to men who were indifferent to the interests of the undertaking. In the co-partnership schemes as generally adopted there was ample provision for dealing with any man who was indifferent to his work. In the schemes with which he (Mr. Bennett) had been connected, such a man did not have his co-partnership agreement renewed. He was given time in which to improve, and to become entitled to a renewal of his agreement; but if he did not improve, he was discharged, in the interests of the other men.

Mr. RONCA asked if it were the fixed intention to adopt a scheme which would give the Company power to deal with slackers.

Mr. BENNETT replied that it most certainly was; otherwise it would not be fair to the men who were doing their best.

Reference was then made to a letter by Mr. Roe, in which he had suggested that the present standard price was too high (it is now 16·8d. per therm), and that there should be a provision that profit-sharing be not adopted until such time as the standard price was reduced to 14·25d. per therm. Mr. Bennett pointed out that until last autumn, when the revenue from residuals was reduced, the Company had supplied gas at 12·8d. per therm, but were not paying the dividends they were entitled to. Last year, they were entitled to pay 10 p.ct., but the actual dividend was 6 p.ct. The present price was 14d. per therm, which entitled the shareholders to a dividend of 8½ p.ct.

Mr. ROE said he objected to profit-sharing in any business, because by adopting it one was "pulling the wrong string;" but he objected

to it particularly in the case of the gas industry, in view of the absence of competition. Profit-sharing was a fascinating study; and, at a casual glance, everything seemed to favour it. Some twenty years ago he had introduced it into his own business; but after some time the men came to the conclusion that they were better without it. He approached the subject as an opponent, not because he objected to the men receiving more money, but simply because he did not think it was suitable. Many trade unions strongly objected to it, and did not think it was the right line to take as a cure for industrial trouble. He objected to what might be called, not only a monopoly, but a sheltered monopoly, and said that, if the profit distributed to the co-partners were to be counted as an expense, it might almost be said that it was a sheltered monopoly with a pre-arranged profit. A gas company, in his view, was one of the last concerns which should undertake co-partnership. As to the contention that the workers, by becoming shareholders, exercised some control over the Company, he said that shareholders did not have real control over the businesses in which they had invested their money. If they made suggestions, the Chairman would thank them for those suggestions, and say that they would be considered by the Directors; and that was as far as it went. Therefore, he did not think it was fair to tell a working man that if he invested his money he would have control of the business as a shareholder. It was better for a worker to put his money into War Loans, and get 4 or 5 p.ct., and his capital guaranteed, than to put it into a gas company and get 6 or 7 p.ct. He was aware that the Leatherhead Company were not paying so high a dividend as they could do with the present standard price; but such a high standard price was very useful to them if profit-sharing were adopted, because they could pay their present dividend of 6 p.ct. to the shareholders, and still have money left for distribution to the workers. It had been said by the Company that profit-sharing resulted in greater efforts on the part of the workers, and reduced costs; he wanted the Company to show the faith that was in them, and to reduce the standard price. In Ashtead (the district adjoining Leatherhead), which was supplied by the Wandsworth, Wimbledon, and Epsom District Gas Company, the standard price was 14·2d. per therm. He saw no reason why the standard price in Ashtead should be lower than that in Leatherhead, because Ashtead was a much more scattered district; and Leatherhead would do better, he believed, if they dropped the Leatherhead Gas Company, and applied for a supply from the Wandsworth Company. As regards slackers, he said that, though a man might not be pulling his full weight, he might not be slacking sufficiently to justify his dismissal. At the present moment there was far too much pampering of working men; but the honest, decent working man did not want pampering. Gas companies, who had pampered their men, were about the only companies who had stuck to profit-sharing. They had a monopoly; and he did not want it made too easy for them to catch profits. That was why he suggested that profit-sharing should not be adopted unless the standard price was reduced to 14·25d., because at that figure they would have something to work for. The proper line to adopt in order to get the employees interested in their work was the establishment of Works Committees. Many gas companies had Works Committees, and they were more successful than profit-sharing schemes, because they enabled the men to discuss matters concerning the business with their employers.

Mr. BENNETT, replying, said he was sorry to hear that Mr. Roe's experience of profit-sharing had not been satisfactory, because in the gas industry it had been an unqualified success. In fact, the success attained had made it almost a household word in Parliament; and it was held up as a pattern to other employers. He disagreed with the suggestion that, by a co-partnership scheme, the men would be tied to the Company, or that they would be pampered. When the scheme was offered to the men, they could reject it *in toto*, or any individual need not enter into the scheme if he did not wish to. The agreements in most co-partnership schemes could not cover a period exceeding twelve months; but they were generally for a shorter period, and men could drop out if they wished at the end of that time. His experience was that every man wanted to come in. Co-partners had the same control over the Company as the ordinary shareholders, who had always the option of combining together and turning the Directors out if they were dissatisfied. He could not accept, on behalf of the Company, any clause making it obligatory to form a Works Committee, and did not think such a clause had been inserted in any previous Order; but he pointed out that in the co-partnership scheme which was usually adopted in the gas industry there was a Co-Partnership Committee functioning in the same way as a Works Commitee. The Redhill Company had a Co-Partnership Committee who did all that a Works Committee would do; and, although there were a few companies with Works Committees quite apart from co-partnership schemes, that was a matter between the workers and the employers.

Mr. RONCA said he gathered Mr. Roe's point was that the only good that came out of co-partnership was the fact that committees were established, which were substantially Works Committees.

Mr. BENNETT replied that if that were the only benefit arising from co-partnership, he could not imagine that so many gas companies would keep co-partnership schemes in being. No gas company, having adopted co-partnership, had thrown it over. Finally, he said that the Company would rather drop co-partnership than have a precedent established in the shape of a provision that the bonus was not to be charged to revenue as a working expense.

European Gas Company, Ltd.—In order to give effect to the Board's decision, already announced, to make the Company's financial year coincide in future with the calendar year, the accounts have been made up for a broken period of nine months, ending on Dec. 31, 1925. The Directors recommend the payment, on April 1 next, of a dividend of 4s. per share, free of tax, in respect of the nine months in question, such dividend to be provided out of reserve of undivided profits, as owing to the effect of the depreciation in the value of the franc, the trading accounts of this period show a loss.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following notices regarding applications to the Board of Trade under the Act.

SECTION I.

Widnes Corporation.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 5s. and 6s. per 1000 c.ft.; and the prices they have asked the Board of Trade to substitute for these are 1s. and 1s. 2·4d. per therm.

DECLARATIONS OF CALORIFIC POWER.

Hexham Gas Company.—450 B.Th.U., in substitution for 425 B.Th.U. (June 7.)

Workington Corporation.—460 B.Th.U. (June 15.)

AMENDING ORDER.

South Shields Gas Company.

The South Shields and Jarrow Corporations and the Hebburn Urban District Council have applied to the Board of Trade for an Amending Order in respect of the South Shields Gas Company, whereby it is desired that a new standard price of 11·8d. per therm shall be substituted for the existing one of 14·4d. per therm.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market remains idle and weak, and though, during the last few days, it has perhaps steadied somewhat, there is still very little doing. Inquiries, both for prompt and forward positions, were very scarce, though merchants are hoping that the lower prices now offering may attract business from the Continent. The crisis in France, on the other hand, is bound to affect adversely any prospects of new business from that quarter.

It is expected that the report of the Coal Commission will be public early this week, and this will quite likely have an effect on the coal market. Collieries are inclined at present to hold their hands as far as forward business is concerned, and are not anxious to quote current rates even for April business, anticipating that the future course of events will be in doubt at any rate for some time yet. In this event there would most likely be an increase of buying orders for the purpose of laying-in stocks.

Good gas coals are still the firmest spot, and they are reasonably well supplied with tonnage, though new orders are scarce. Wear Specials quote 19s. f.o.b., and best qualities are about 17s. 6d. Seconds are still fairly freely offered, but are perhaps slightly firmer in tone, and they quote round 14s. 6d. Business in coking coals is practically at a standstill, and prices are nominally 14s. to 14s. 6d.

The coke market is easy, and business maturing slowly, gas makes quoting 22s. to 23s. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

While the best qualities of household coal in Yorkshire and Lancashire have maintained average prices, the secondary descriptions are inclined to be rather easier.

The industrial situation does not improve. Consumers seem inclined to await the issue of the Coal Commission report. The general uncertainty of the trade has retarded forward business among many of the key industries; and until the situation is clear, many businesses will be marking time.

There is no new feature in the gas coal trade, although it is suggested that prices are likely to be increased slightly in order to counteract a reduction in the prices of other industrial fuels.

The outlook for the export trade is worse than ever; and unless a more settled state of affairs prevails, the nearer Continental importer apparently does not feel inclined to rely upon British coal. The tendency of the moment is to negotiate for fuels that are more or less sure to be available in preference to British coals.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire — Hards, Association, 20s. 9d.; screened gas coal, 20s.; washed doubles, 19s. 9d.; washed singles, 17s. 6d.; washed smalls, 12s. 3d.; unwashed doubles, 18s.; rough slack, 9s. 3d.; smithy peas, 19s. to 20s. 6d. West Yorkshire—Hartleys (f.o.b. Goole), 17s. 9d. to 18s. 9d.; washed doubles, 18s.; washed singles, 17s.; washed smalls, 12s. 3d.; unwashed trebles, 17s. 6d.; unwashed doubles, 16s.; rough slack, 10s.; coking smalls, 9s. 6d. to 10s. Derbyshire and Nottinghamshire—Top hards, 21s. to 22s. 6d.; washed singles, 17s. to 17s. 6d.; washed smalls, 12s.; unwashed doubles, 14s.; rough slack, 9s. 6d. to 10s. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 18s. to 19s.; gas coke, 22s. to 24s.; furnace coke, 16s. 6d. to 17s. 6d. per ton.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

Output continues to be fairly well maintained; the return of colder weather having checked the deterioration in the house coal trade. A number of collieries notified reductions in the first week of March amounting to 2s. in the case of some descriptions of best coal and 6d. to 1s. in lower grades. Those concerns which refused to take hasty action on the assumption that winter was over have been to some extent justified by the event, though the market has not recovered much momentum. The industrial demand has undergone no essential change. Values, while weak, are not generally lower. Spot lots are to be had on relatively favourable terms. Gas and electricity undertakings and the railways are strengthening their reserves. Public institutions, too, have an eye to eventualities. But neither the industrialist nor the domestic consumer is taking precautions which seriously weigh in the balance of supply and demand. Nuts, beans, and slacks are plentiful, and values are easy.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 8.

The price of pitch continues to advance, and it is reported that business is possible at about 85s. per ton for this season's shipment; the price for next season being about 80s. per ton. Supplies available for prompt are very limited, and the market is firm.

Creosote is steady and firm at 7⅛d. to 7¼d. per gallon net and naked at makers' works.

Tar spirits and other products are unaltered.

Tar Products in the Provinces.

March 8.

The market for pitch has remained very firm during the past week, and a fair amount of business is reported at the increased values.

The average values for gas-works products during the week were: Gas-works tar, 54s. 9d. to 59s. 9d. Pitch, East Coast, 82s. to 83s. f.o.b. West Coast—Manchester, 75s. to 76s.; Liverpool, 76s. to 77s.; Clyde, 79s. to 80s. Benzole, 90 p.ct. North, 1s. 8½d. to 1s. 9½d.; crude, 65 p.ct., at 120° C., 1s. 1d. to 1s. 2d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 8½d. to 1s. 9½d. Toluole, naked, North, 1s. 8d. to 1s. 9d., nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 11½d. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6d. to 6⅛d.; Scotland, 5¾d. to 6d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Limerick Gas Plant.—The West's Gas Improvement Company, Ltd., have commenced the extension of the Limerick gas-works plant, in respect of which the Corporation recently obtained sanction to a loan of £20,000.

Retford's Gas Loan.—The Retford Town Council have decided to make application to the Ministry of Health for sanction to a loan of £6663 for the provision of gas mains necessary to enable the undertaking to cope with an ever-increasing public demand for gas.

Australian Gas Light Company.—The Directors recommended the payment of a dividend for the six months ended Dec. 31 last of 4 p.ct. on the old "A" and "B" shares, and in proportion on the new "A" shares. The balance to be carried forward is £20,965.

Memorial Service at Southwark Cathedral.—On Saturday afternoon last, at Southwark Cathedral, a service was held in memory of 386 men of the South Metropolitan Gas Company who died for their country during the European War. The Metrogas Choral Society sang two anthems and a contakion for the departed.

Brentwood Gas Company's Debenture Issue.—Our advertisement pages to-day contain the announcement of an issue by Messrs. A. & W. Richards, on behalf of the Directors, of £25,000 of 5½ p.ct. perpetual debenture stock in the Brentwood Gas Company, at the minimum price of par. Tenders must be received at 37, Walbrook, E.C., not later than Thursday morning, March 18. Money is required to enable the growing demands for gas to be met.

Lecture at Bedford.—"Bedford's Gas Service" was the title of an address delivered to the members of the Bedford Rotary Club, on Feb. 16, by Mr. J. B. Hansford, Engineer and Manager of the Bedford District Gas Company. The lecturer traced the history of the Company from its formation in 1833 to the present day. In 1853, after twenty years' existence, there were 333 consumers, and the output of gas totalled 4¾ million c.ft. per annum. To-day the figures are 10,300 and 360 millions respectively.

Rating of Machinery.—The Minister of Health has appointed a Committee, consisting of the Right Hon. Edward Shortt, K.C. (Chairman), and Messrs. Arthur Body, F.S.I., W. Craig Henderson, K.C., W. H. Patchell, M.Inst.C.E., and A. H. Preece, M.Inst.C.E., to prepare a statement in accordance with the provisions of section 24 of the Rating and Valuation Act, 1925, setting-out in detail all machinery and plant which appears to them to fall within any of the classes specified in the third schedule to the Act. All communications to the Committee should be addressed to the Secretary, Mr. A. N. Rucker, Ministry of Health, Whitehall, S.W. 1.

Relief of Rates at Stafford.—Some discussion took place at a recent meeting of the Stafford Town Council as to the amount to be taken from the gas undertaking. Alderman R. J. Young moved an amendment that the Gas Committee's contribution should be £1000, instead of £2000 as recommended. That Committee, he said, favoured a reduction in the price of gas, which they thought would be more acceptable to poor people. If, however, the original recommendation was carried, any reduction would be impossible. An expenditure of £10,000 was contemplated by the Gas Committee on vertical retorts, and a further outlay of £5000 in other directions. The recommendation to take £2000 was eventually adopted.

Wellington (N.Z.) Gas Company, Ltd.—In their annual report and statement of accounts for the year ended Dec. 31 last, the Directors state that highly satisfactory results continue from the Glover West vertical retort plant. Twelve miles of new mains have been laid, 917 services connected, and 1370 cookers fixed. This constitutes a record. A reduction of 2d. per 1000 c.ft. was made in the price of gas in April. A further reduction of 2d. operated from Oct. 1. Six reductions have been made during the past three years, making a total decrease of 17d. per 1000 c.ft. After payment of the interim dividend of 4 p.ct. on the ordinary shares, the year's dividend on the preference shares, providing for depreciation of plant, buildings, and machinery, also for depreciation reserve, the profit and loss balance amounts to £38,285, which it is proposed to appropriate as follows: A further dividend of 4 p.ct. (making 8 p.ct. for the year); and a carry-forward of £27,133.

TRADE NOTES.

Copes Automatic Feed Water Regulators.

Messrs. James Gordon & Co., Ltd., Windsor House, Kingsway, W.C. 2, have during the last two months received orders for over seventy equipments of Copes automatic feed water regulators.

Stoking Machines and Coal Handling Plant.

Messrs. Aldridge & Ranken, Ltd., inform us that they have received an order from the Brisbane Gas Company, Queensland, for one of their latest type stoking machines and complete coal handling plant. They also have in hand orders for the Congdon system for Stretford (third installation), Bristol, and Genoa, and a repeat order for a stoking machine for Genoa.

For Soiled Hands.

Under the registered trade mark of "Taroclen," Messrs. Clarks Lead and Colour Works Company, of Reading, are marketing a preparation which is superior to soap as a cleanser for dirty and greasy hands. Taroclen is used in the same way as soap; and as no potash is employed in its manufacture, it has no deleterious effect on the hands. A trial of the preparation has proved its efficacy.

"Lopulco" Products.

International Combustion, Ltd., state that on account of the enormous growth in the demand for their British manufactured "Lopulco" products, it has become necessary to proceed immediately with an important extension of the works at Derby. The total value of the work is estimated at about £100,000. At the Barrow works so many orders for Raymond pulverizers have been received this year that additional machinery is to be installed immediately for dealing with the manufacture of this equipment.

CONTRACTS OPEN.

Engine Oils, &c.

Tenders are invited by the Gas and Electricity Committee of the Rochdale Corporation for various oils. [See advert. on p. 638.]

Exhausters.

Tenders are invited by the County Borough of Salford for the supply and erection of one set of steam-driven exhausters. [See advert. on p. 638.]

Pipes, &c.

The Wotton-under-Edge Gas Company are inviting tenders for wrought-iron gas main pipes. [See advert. on p. 638.]

Tenders are invited by the Gas and Electricity Committee of the Rochdale Corporation for the supply of cast-iron mains and specials, wrought-iron tubes, and malleable iron fittings, &c. [See advert. on p. 638.]

Steel Mains and Specials.

The Pontypridd Urban District Council invite tenders for the supply of steel mains and specials. [See advert. on p. 638.]

Vertical Retorts, Coke Handling Plant, Extensions, &c.

The Gas Committee of the County Borough of Warrington are inviting tenders for an installation of vertical retorts, coke-handling and screening plant, and extension of overhead railway and coal stores. [See advert. on p. 638.]

Sulzer Plant for Burnley.—The Burnley Town Council have approved the Gas Committee's recommendation to instal a Sulzer coke cooling plant at a cost of £18,500. Except for special parts estimated at £1600 the whole of the plant will be British made. Mr. Sulzer, of Switzerland, has offered, if desired, to instal at cost price to the Corporation all improvements adopted within a period of two years from the end of the maintenance period of the contract.

The Coventry City Council have decided to alter and convert certain plant at the Foleshill Gas-Works at a cost of £10,471.

The Blackpool Corporation have applied to the Ministry of Health for permission to borrow £26,455 for gas mains, and £7300 for gas lamps and compressor.

The Ellesmere Urban District Council are contemplating the erection of a new gasholder, and have engaged Messrs. Anderson Brothers as Consulting Engineers, to advise them in the matter.

At a recent meeting of the Ballymena Urban Council, the Land and Finance Committee recommended that the Council should repay the instalment of principal and interest on the outstanding portion of the original cost of the gas-works loan, which is £13,062, from the general rate.

At a meeting of the Blackburn Town Council on March 4, Councillor E. Hamer, J.P. (Chairman of the Gas Committee), referred to a decision of the Committee authorizing the posting of notices at the gas-works, on the question of the reorganization of employers and employees, in accordance with the request of the Manchester Regional Joint Industrial Gas Council. He wished to disassociate himself with this resolution entirely, which he regarded as un-British and as preventing employees from exercising their individual freedom.

On Feb. 25 Mr. J. H. Wilson, of Messrs. Geo. Wilson Gas Meters, Ltd., Coventry, gave an interesting practical address on "Gas Meters," in the lecture room at the showrooms of the Leamington Priors Gas Company, to the employees of the Company and those of neighbouring gas undertakings. Mr. Wilson dealt with the construction of wet, dry, and prepayment meters; the necessity for careful handling; and the points to be borne in mind when fixing meters. He also dealt with the effect which overloading meters has on their registration; the various methods of testing; and how to maintain their efficiency. He mentioned the "Certus" system of lubrication, recently brought out by his firm.

STOCK MARKET REPORT.

WITH the exception of a revival of interest in Rubber shares, dealings on the Stock Exchange last week were again extremely moderate. Gilt-edged stocks were dull, and Internationals were unsettled by the further improvement, prior to the French Government defeat, in the value of the franc; while American selling of Funding Loan caused that security to depreciate. There was some anxiety shown by the slump in stock and share values in New York; but towards the close of the week the position in Wall Street improved, general confidence in the trading conditions being responsible.

There were some interesting features in the Industrial Market. Textiles, Stores, and Tobaccos were most prominent. Iron and Steel shares were left severely alone; the market awaiting with some concern the Coal Commission Report, which was signed on Saturday last.

Despite the uncertainty, and condemnation of the electricity proposals by the chairmen at the annual meetings of both gas and electricity companies, the shares of electrical apparatus and components manufacturing companies continue to be well supported, and the prices of Henleys, India Rubber Gutta Perchas, and Metropolitan Vickers all hardened. Gas Stocks, on the other hand, still show a tendency to fall. There were a large number of *ex* div. reductions; but it will be seen from the Table that stocks have been marked down in some cases by more than the value of the half-year's dividend. In addition, British and the Gas Light ordinary stocks have fallen a further 2 and 1½ points respectively. Two further dividends are announced. Lea Bridge ordinary are paying 6½ p.ct. per annum, and East Hull ordinary 5 p.ct. per annum, both dividends being at the same rates as for the corresponding half-year of 1924. The European Gas Company report a loss on the year's trading, owing to the fall in the value of the franc, but the dividend, paid out of reserves, is at the same rate as for Dec., 1924.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Mar. 5.	Rise or Fall.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 4	5	5	Aldershot 5 p.c. max. C.	74—77	..	76
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—74	..	69½
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	69—73	..	70—71½
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	58—63	..	..
300,000	1	Oct. 22	1/7½	1/7½	Bombay, Ltd.	⅝—1	..	..
170,000	10	Mar. 4	8½	8½	Bournemouth 5 p.c.	12—13*	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12—12½*	..	12½
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12*	..	..
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	172—177	..	..
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	..
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91*a*	..	87
855,000	,,	Oct. 8	7	8	British Ord.	101—106	−2	102—103½
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref.	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—74	..	71
100,000	10	Dec. 17	8	6	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref.	6—7	..	6½—6⅝
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	Feb. 18	6	6	Cardiff Con. Ord.	96—99	..	..
237,860	,,	Jan. 7	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Mar. 4	5	6½	Chester 5 p.c. Ord.	90—95*b*	..	..
79,185	1	Oct. 18	—	2/-	Colombo Ltd. Ord.	25/—27/-	..	..
24,500	1	,,	—	1/4½	Do. 7 p.c. Pref.	21/—23/-	..	..
1,513,280	Stk.	Mar. 4	5½	5½	Commercial 4 p.c. Cap.	76—81*	−4	..
560,000	,,	,,	5/8¾	5/8¾	Do. 3½ p.c. Cap.	76—81*	−4	..
475,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	55—58	..	55½—56½
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	33—38	..	34
200,000	,,	Mar. 4	7	7	Do. 7 p.c. Pref.	85—88*	−3	..
737,150	,,	Mar. 4	6½	6½	Croydon sliding scale	95—98*	−2½	99—99½
403,100	,,	,,	5	5	Do. max. div.	79—82*	−2	..
492,270	,,	Mar. 4	6	9	Derby Con.	109—111*c*	..	..
55,000	,,	Dec. 17	4	4	Do. Deb.	74—76*c*	..	..
209,000	,,	Mar. 4	5	5	East Hull Ord. 5 p.c.	86—89*	−2	..
50,000	,,	Dec. 17	—	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	July 23	4	6	European, Ltd.	5⅞—6⅜	..	6—6⅜
16,413,285	Stk.	Feb. 18	5½	4/17/4	Gas Light & Coke 4 p.c. Ord.	77—79	−1½	77½—79½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61	..	58-59½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	75—78	..	75
4,761,930	,,	Dec. 17	3	3	Do. 3 p.c. Con. Deb.	58—61	..	57¾—59½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb	..	..	..
82,500	,,	Sept. 10	6⅔	6⅔	Hastings & St L. 5 p.c. Conv	90—95	..	..
258,740	,,	,,	5⅓	5⅓	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	19⅜—20⅜	+½	20⅜
86,600	Stk.	Mar. 4	10	10	Hornsey 7 p.c.	128—133*	−4	..
1,976,000	,,	Nov. 19	59	10	Imperial Continental Cap.	135—140	..	136—138½
226,170	,,	Feb. 4	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	..
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Feb. 18	5½	5½	Liverpool 5 p.c. Ord.	81½—82½*b*	..	..
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	103—105*b*	..	..
165,736	,,	Feb. 18	9	8	Maidstone 5 p.c. Cap.	115—120	..	..
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 3	7	6	Malta & Mediterranean	4½—5	..	..
541,920	Stk.	Nov. 19	4	4	Montevideo, Ltd.	69—73	..	..
2,061,315	,,	Mar. 4	5	5	Newcastle & Gateshead Con.	72⅔—73⅔*d**	−2	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	75—76*d**	−1½	..
529,705	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb.	70—72*d*	..	..
15,000	,,	Mar. 4	11½	11½	North Middlesex 10 p.c.	155—160*	−5	..
91,530	,,	,,	8⅘	8⅘	Do. 7 p.c.	112—117*	−3	..
300,000	Stk.	Dec. 3	7	9	Oriental, Ltd.	98—103	..	101—102
188,120	,,	Jan. 7	7½	7½	Plym'th & Ston'house 5 p.c.	110—115	..	..
60,000	50	Mar. 4	14	14	Portsea Island B	90—95*	−2	..
100,000	50	,,	13	13	Do. C	88—93*	−2	..
2,289,909	1	—	—	—	Primitiva Ord.	10/9—11/9	−/3	10/9—11/1½
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	82—84	..	83¾—84
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	65—67	..	..
193,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7⅞—8¼	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	..	..
270,000	Stk.	Aug. 27	5⅓	5⅓	Sheffield A	100—102*e*	..	..
419,968	,,	,,	5⅓	5⅓	Do. B	100—102*e*	..	..
1,047,000	,,	,,	5⅓	5⅓	Do. C	100—102*e*	..	..
90,000	10	June 11	6	4	South African	5—7	..	..
6,609,895	Stk.	Mar. 4	5	7	South Met. Ord.	90—92*	−3	90½—94
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb.	56—59	..	..
734,000	,,	Mar. 4	6½	6½	Do. 6½ p.c. Red. Db.	102—104*	−2	104
91,500	,,	Mar. 4	8½	8½	South Shields Con.	121—123*d**	−3	..
1,187,795	,,	Mar. 4	6⅔	6⅔	South Suburban Ord. 5 p.c.	95—98*	−2½	95—95⅞
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94—97	..	..
647,740	,,	Oct. 22	5	5	South'mpton Ord. 5 p.c. max.	78—81	..	..
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69—74	..	..
250,000	,,	Mar. 4	7	7	Swansea 7 p.c. Red. Pref.	100—102*	−2	100½
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	Feb. 18	7½	7½	Tottenham District A 5 p.c.	107—112	..	110—111
882,275	,,	,,	5⅞	5⅞	Do. B 3½ p.c.	86—91	..	87—88½
150,000	,,	,,	28/4	5½	Do. 5½ p.c. Pref.	101—103	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	74—75
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	69—70*d*	..	..
197,294	,,	Mar. 4	6⅔	6⅔	Do. 5 p.c. pref.	90—95*	−3	..
88,330	,,	,,	5	5	Do. 5 p.c. Maidenh'd	85—90*	−3	..
91,800	,,	,,	6⅔	6⅔	Wandsworth, Wimbledon, and Epsom—	87—92*	−1	..
30,000	,,	Mar. 4	8½	8½	Wandsworth A 5 p.c.	123—128*	−5	..
255,636	,,	,,	7	7	Do. B 3½ p.c.	103—108*	−6	..
412,450	,,	,,	5/19/0	5/19/0	Do. C and New	88—93*	−4	..
352,000	,,	,,	6⅔	6⅔	Wimbledon 5 p.c.	97—102*	−3	..
98,000	,,	,,	7½	7½	Epsom 5 p.c.	105—110*	−8	..
88,416	,,	Jan. 7	3	3	3 p.c. Deb.	55—58	..	..

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *Ex. div.

The following transactions were recorded during the week:

On Monday, British 102, 102½, 103½, 4 p.ct. debenture 71, Cape Town 4½ p.ct. preference 6¼, 6⅜, Gas Light and Coke 78, 78½, 78⅜, 79, 79½ *ex* div., 3½ p.ct. maximum 58, 58½, 59 *ex* div., 3 p.ct. debenture 59¼, Hong Kong and China 20½, Imperial Continental 136, 138½, Primitiva 11s., South Metropolitan 93, 94, Tottenham 4 p.ct. debenture 74, 74¾.

On Tuesday, Alliance and Dublin 70, British 102, Cape Town 4½ p.ct. preference 6 5/16, Commercial 3 p.ct. debenture 55½, Croydon sliding-scale 99, 99½, Gas Light and Coke 77½, 78, 78¼ *ex* div., 3½ p.ct. maximum 58¼ *ex* div., 4 p.ct. preference 75 *ex* div., Oriental 101, Primitiva 11s. 1½d., 4 p.ct. debentures 83⅜, 84, South Metropolitan 94, 6½ p.ct. debenture 104. Supplementary prices, North Middlesex 5 p.ct. debenture 95.

On Wednesday, Bournemouth "B" 12¼, Bristol 5 p.ct. 87, Gas Light and Coke 77½, 78, 78¼ *ex* div., 3 p.ct. debenture 58, 58½, 58⅝, Imperial Continental 137, Oriental 102 Primitiva 10s. 9¾d., South Barracas 1½d., South Metropolitan 91½, 94, Tottenham "A" 110, 111 *ex* div., "B" 87 *ex* div. Supplementary prices, Barnet "D" 102¾, Colonial Gas Association 22s. 6d., 23s., "New" 3d. pm., 8 p.ct. preference 3d. pm.

On Thursday, Aldershot 4 p.ct. preference 69½, Alliance and Dublin 71¾, Continental Union 34, European 6 9/32, Gas Light and Coke 77½, 78, 78¼, 3½ p.ct. maximum 59¼, 3 p.ct. debenture 58, Imperial Continental 138½, Primitiva 10s. 10¾d., 11s. 0¾d., 11s. 1½d., South Metropolitan 90½, 90¾, 91¼ *ex* div., South Suburban 5 p.ct. 95¾ *ex* div., Swansea 7 p.ct. preference 100½ *ex* div., Tottenham "B" 88½. Supplementary prices, Colonial 22s. 7½d., 22s. 9d., 7 p.ct. preference 22s., 22s. 3d., 22s. 9d., 8 p.ct. preference 3d. pm., Metropolitan (of Melbourne) £9 5s. 6d.

On Friday, Aldershot "C" 76, Commercial 3 p.ct. debenture 56½, European 6, 6⅛, Gas Light and Coke 77½, 77⅞, 77⅝, 78, 78⅛, 78¼, 3 p.ct. debenture 57⅜, 58½, 58¾, Primitiva 10s. 9d., 11s. 1½d., South Metropolitan 90½, 91, 91¼ *ex* div., South Suburban 5 p.ct. 95 *ex* div., Tottenham 4 p.ct. debenture 74, 75. Supplementary prices, Colonial "New" 1½d., 3d. pm.

The monetary conditions have tightened up considerably, which is partly due to the measures taken by the Bank against adverse American influences. On Friday the situation, as is usual at the close of the week, eased slightly; and while 4½ p.ct. was paid for either old or new money, balances were obtainable later at 4 p.ct. As was expected, Treasury Bill tenders were sold at a higher rate than the previous week; the average being £4 6s. 1·59d. p.ct., or 3s. 10·47d. p.ct. higher than the average of the last allotment.

In the Foreign Exchange Market, Sterling on New York was very steady at 4.85 3/32. French francs, on favourable political rumours, improved slightly, and closed on Friday at 130. On the fall of the Briand Government, however, the price fell away 5 points. The continued decline in the Dutch exchange was the main feature; the closing price being 12.12. Belgian francs were steady at 106.97½; and Italian lire improved to 121.

There was a slight rally in the price of Silver, which rose, on Indian purchases, to 30⅜d. per oz. No supplies of Gold were available, the price remaining nominally at 84s. 11d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct.